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Health and Safety

The debate in the House on a Private Member's Bill* outlining a compulsory system for inspection and safety provisions in industrial and commercial concerns revealed clearly that such matters were best left to voluntary effort and, finally, the proposed measure was "talked out." A day or two later, at Ashorne Hill, there was held a conference on this subject organized by the Council of Ironfoundry Associations, at which Sir George Barnett, the Chief Inspector of Factories, delivered an important address. He referred in some detail to the new Iron and Steel Foundries (Health and Safety) Regulations and stressed that interpretation must necessarily vary according to the type, size and age of the plant involved. The process of application must *force majeure* be evolutionary. New concerns obviously would have to conform with the statutory provisions, and even those may have difficulty in assuring very good ventilation, since, as yet, the ridding of an enclosed area from smoke and fumes is by no means an exact science.

A feature of the conference was a widespread expression of opinion that safety posters cannot be too gruesome. The more horrific the illustration the better the result achieved; however, these are but shock tactics and short-lived in their effect. Stress was rightly laid, too, upon general good-housekeeping as a cardinal factor in the reduction of accidents and no one factor is of more importance than good lighting. Next in order comes tidyness, for it should be constantly borne in mind that it is not the serious types of accident featured on the front pages of newspapers, calamitous though they be, which do the most widespread damage to human beings. It is rather such matters as involuntarily falling or being hit by something falling, through faulty stacking or the like. One owner of a smallish ironfoundry has time to be his own safety officer and finds that his enthusiasm for the elimination of accidents is contagious and yields good results. Wherever possible, foundry owners should follow this idea, or at least find amongst their staff a leader possessing a flair for inculcating safety measures.

Naturally enough, at the conference, there were many references to the garnering of statistics, which could be correlated with efforts made towards accident reduction. This, for the larger firms, is an excellent means for providing data as to the origin and frequency of accidents. In one case (not the foundry industry) it was shown that by giving protection to the arms and wrists, 75 per cent. of a group of burning accidents could be eliminated. It would appear that similar action could be taken by some of the great foundry groups, and thereby Government statistics could be sub-divided to reveal specific causes, and remedies instituted. There is one feature where managements could help, and that is by themselves using the safety appliances and clothing provided for their employees. Foundry foremen could set an example by using spats, whilst the directors, when entering the fettling shops, could usefully don goggles. In a large alkali works, an office girl would not be allowed to run into the works without wearing a grotesque hard hat, yet such temporary inelegance is nothing compared with the disfigurement which could be caused by a few drops of alkali falling from an overhead pipe on to her curly head. In a Doncaster works, having an American origin, no one is allowed to enter the foundry without wearing goggles. It is only by such precepts that the essential "safety" consciousness will permeate the mentality of the average British workman or woman.

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* See page 270 of this issue.

I.B.F. Jubilee Competition Results

In connection with the 50th anniversary celebrations of the establishment of the Institute of British Foundrymen, a Jubilee competition was organized open to all the younger members of the Institute. A separate competition was held for each of the branches submitting a minimum number of three entries, and the winners, together with competitors in other branches, were considered for the national award. The adjudicators have now announced the results, which are as follow:—

Winner of the national award: Dennis Frederick Bailey, of Coventry, for his Paper, "Some Aspects of Shell-moulding Technique."

Winners of branch prizes: Birmingham—Dennis Frederick Bailey for his Paper, "Some Aspects of Shell-moulding Technique"; Lancashire—Robert Kirkham Jackson for his Paper, "Shell Moulding and the Economic Use of Shell-moulding Material"; London—Neville Yoxall Newton for his Paper, "Some Aspects of Metallurgical Control in the Modern Steel Foundry"; Newcastle-upon-Tyne—William Burn Henry for his Paper, "Some Influences of Cupola Charge Composition upon the Properties of Grey Cast Iron"; and Tees-side—Alan Dale for his paper, "Microscopy in the Iron Foundry."

The national award will be presented at the Institute's Jubilee Lecture, to be held at the Cafe Royal, Regent Street, London, on Friday, April 9, at 2.30 p.m., and the branch prizes will be presented at meetings of the respective branches.

National Patternmakers' Association

This is the name selected by the steering committee which was elected at the public meeting held in Birmingham on February 3 to represent the affairs of patternmakers on a country-wide scale. The organization now being formed is quite new. Mr. B. Levy (of B. Levy (Patterns), Limited, 3 to 5, Osbert Street, London, S.W.1) was elected chairman—*pro tem*—and from him readers can obtain full details of the new Association. Mann, Judd & Company, 8, Fredericks Place, Old Jewry, London, E.C.2, were appointed secretaries. A meeting will be held in the near future to approve of the constitution, to elect officers, and so forth.

R.S.A. Bursaries

Included in the list of winning and commended students for the Industrial Art Bursaries Competition, 1953, organized by the Royal Society of Arts, in the section "Domestic Solid-fuel-burning Appliances," are Mr. Frank Watkins, 53, Queen's Gate Gardens, South Kensington, S.W.7 (School of Wood, Metals & Plastics, Royal College of Art; age 28) (bursary £150); Mr. William Easton Wren, "Murrayvale," 67, Main Street, Bonnybridge, Stirlingshire, Scotland (a draughtsman in the drawing office of Messrs. Lane & Girvan, Limited, Bonnybridge; age 27) (bursary £75); Mr. Anthony Charles Blight, 16, Derby Hill Crescent, Forest Hill, London, S.E.23 (L.C.C. Central School of Arts and Crafts; age 17) (commended); and Mr. John Vernon Sharp, 16, Clissold Road, N.16 (School of Wood, Metals and Plastics, Royal College of Art; age 26) (commended).

Dinner

AGA HEAT, LIMITED

Mr. Vincent Jobson presided over the annual Agents' Conference dinner held last week at the Dorchester Hotel. With him at the high table were Mr. Eric Bellingham, O.B.E., LL.D.; Mr. J. Stanleigh Turner, J.P.; Mr. James Shaw; Mr. W. T. Wren; Mr. H. V. Shelton; Mr. O. Stott; Mr. A. Sykes; Mr. H. C. Wilson Bennetts; Mr. G. A. Pochin; Mr. R. G. Elliot; Mr. F. Ogilvy; Capt. J. D. Walker, R.E.; Mr. R. A. Sherman; Mr. R. J. Moffat, M.B.E.; Mr. G. Savile Steven; Mr. A. Young; Mr. R. G. Leach; Mr. A. H. Masser; Mr. W. J. Hoad; Mr. C. Insch; and Mr. K. C. Bowyer. The function was organized by Mr. N. G. Streat.

Latest Foundry Statistics

According to the Ministry of Supply, the output in November, 1953, of aluminium sand, gravity-die and pressure-die-castings was 1,769, 3,604 and 1,178 tons respectively. The corresponding totals for the first eleven months were 18,511, 31,333 and 10,187 tons. During November, the foundry industry manufactured 314 tons of magnesium-alloy castings, bringing the total up to 3,773 tons for the first eleven months.

A police escort was arranged for the transport of this 16*-ft. dia. casting—the largest ever made by the Carron Company, Falkirk, in its* 196 *years' existence. Weighing almost* 9 *tons, it is the first half of a vapour belt for an evaporator for sugar machinery to be exported to Venezuela. It made a* 25*-mile journey to the Glasgow works of Mirrlees, Watson & Company, Limited.*

Iron and Steel Foundries Regulations 1953: their Relationship to Safety*

By Sir George Barnett
(H.M. Chief Inspector of Factories)

Historical

As the subject of my talk is "The Iron and Steel Foundries Regulations, 1953: their Relationship to Safety," it will be useful by way of introduction to give the history of the origin of these Regulations. In 1945, the employers' organizations and trade unions connected with the ironfounding industry were approached by my predecessor, Sir Wilfrid Garrett, with the suggestion that a Joint Advisory Committee might be set up to consider methods of improving general working conditions in foundries. This suggestion was welcomed by the trade and the committee, consisting of seven representatives alike from employers and wage-earners of the industry, a technical adviser and certain Inspectors of Factories, was constituted, with terms of reference as follow:—

> To advise the Chief Inspector of Factories on the most effective methods of implementing certain requirements of the Factories Act, 1937, and on other cognate problems in iron foundries, particularly those relating to cleanliness, lighting, ventilation, and maintenance of satisfactory atmospheric conditions, provision of washing facilities and accommodation for workers' clothing and other welfare and health services and amenities.

This committee reported in 1947, and in its report members stated they felt that the main objectives which they had in mind were:—(1) Provision of better amenities and more comfortable and healthy working conditions; (2) improvement of the appearance of iron foundries through better cleanliness and orderliness and more light and colour; and (3) improvement of the atmospheric conditions by prevention or removal of dust, smoke and fumes; and their recommendations were clearly made with these ends in view. It will therefore be noted that, in the main, this committee did not deal with questions of safety in iron foundries. However, accidents arise from unsatisfactory environmental conditions and therefore, insofar as they dealt with that side of the subject, certain of the committee's recommendations in a broad sense aimed at safer conditions.

It was decided, in accepting the report, to set up, as they themselves suggested, a Joint Standing Committee, the main function of which was to keep under review conditions and developments in the industry affecting the health, welfare and safety of personnel. This Committee has been sitting continuously since that time and has accomplished a great deal. It was felt that considerable progress was being made by voluntary effort, and in view of this, the Factory Department was not prepared to force matters by the issue of a statutory code of regulations. However, a Private Member's Bill was brought before Parliament at the end of 1952, which incorporated some of the recommendations of the Garrett Committee with a view to their being made law. It seemed desirable that, if statutory requirements were to be made, these should be brought into line with the usual Factory Act procedure and made in accordance with the requirements there laid down. After the second reading, the Private Member's Bill was withdrawn on the understanding that the Minister would introduce "Regulations" which dealt with the main points which had been incorporated in the Bill. A code of Regulations following fairly closely the provisions in the Private Member's Bill was drafted and was subject to the usual procedure of discussion with the empioyers' representatives and trade unions in the hope of obtaining agreement on the particular matters dealt with. After many meetings, a draft was eventually produced on which agreement was registered, and that draft was then published and ultimately gazetted by the Minister last year. The Joint Standing Committee, in making recommendations on a wide variety of subjects, had pointed out that foundries differ in size and methods of production and produce all kinds of castings, so that some flexibility was necessary as regards the nature and application of the recommendations, and there has been an endeavour, within the legal phraseology in which Regulations must be couched, to obtain a reasonable standard of flexibility.

Main Safety Provisions

I do not propose to survey the whole of the Regulations, but to deal mainly with those which are particularly drafted, not only to provide better environmental conditions, but to assist in obtaining a better standard of safety. One of the main principles whereby safer conditions are obtainable in factories generally is in the adoption of better housekeeping and Regulation (4) of the Code, which deals with the arrangement and storage of plant, working gear and materials, is essentially aimed at maintaining a high standard of safety and cleanliness by orderly arrangement of such materials and gear. This Regulation applies to

* Presented at the Safety Conference held last week at Ashorne Hill, organized by the Council of Ironfoundry Associations.

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workrooms only and does not deal with storage arrangements in open spaces and yards outside the foundry. It places obligations on both employers and wage-earners; the former to provide suitable racks, bins or other receptacles for storage, the latter to use them, and both to see that these things are arranged in a safe manner. In connection with Regulation (4) (*1*) there is, on the whole, little bulk storage of materials in foundry workrooms, and bins will not be required for the supplies of sand which moulders have by them when preparing moulds.

The Committee directed particular attention to this question of good-housekeeping, and expressed and recorded that in many foundries very little attention was in fact paid to this matter, with the result that heavy equipment was dumped anywhere about the foundry and materials and gear of all kinds were scattered about indiscriminately. They regarded, as I have always done, good-housekeeping as of major importance because it facilitates not only the establishment of clean and safe conditions, but it has a very beneficial effect on morale and production efficiency.

The next Regulation (5) is essentially a safety requirement aimed at preventing some of the regrettable accidents due to the splashing of molten metal, which are unfortunately so common in the foundry industry, and relates to work near cupolas and furnaces. The first five lines of this Regulation define what may be called a "danger area." The last five lines describe two classes of work which may be carried out in the danger area, *viz.*:—

(*a*) Work which "is necessary for the proper use or maintenance of a cupola or furnace," and

(*b*) work which "is being carried out at such a time and under such conditions that there is no danger from molten metal which is being obtained from the cupola or furnace or is in a ladle in position at the end of the spout."

With regard to (*a*), "proper use" should be regarded as covering the work of taking a ladle to, and removing it from, a cupola spout for the purpose of obtaining molten metal, and would allow furnace men to remain in the danger area whilst required to attend to cupolas or furnaces. With regard to (*b*), this would allow any kind of work to proceed in the danger area at any time when molten metal is not being obtained from the cupola or furnace, or is not standing in a ladle at the end of a spout; and also in any part of the defined danger area while metal is being obtained if there were no danger from the molten metal which is being obtained from the cupola or furnace or is in a ladle at the end of the spout. Moulds could therefore be made within the danger area whilst the cupola is not being tapped. They could not, however, be poured whilst molten metal is being obtained from the furnace unless there is no danger to the person carrying it out.

In determining the limits of the danger area, the 12 ft. distance is to be measured from the delivery end of the furnace spout, but it should be noted that, if a receiver or forehearth is fitted, the distance is measured from the delivery spout of the receiver. Another distance is also given, namely, 8 ft. from the vertical line passing through the nearest part of a ladle which is in position at the end of the spout, but it should be noted that the two distances are not alternatives, but impose a dual obligation. The requirement of the Regulation would not, therefore, be complied with if only one distance is satisfied and in practice that distance should be selected which removes a man furthest from the molten metal.

Some difficulty may arise with this Regulation in the case of mechanized foundries, although in many cases the pouring station on a conveyor system will be outside the 12-ft. radius from the furnace spout. In some cases, however, the man at the station may be within that distance, but by a slight re-arrangement of the work or the provision of suitable asbestos or other screens the requirement could be complied with. Where, however, the conveyor belt in mechanized foundries is so placed that the pouring station is within 12 ft. of the furnace spout and it is impracticable to re-arrange the whole of the mechanized layout, including knock-out stations, without going to a great deal of expense, the question of granting an exemption certificate under Regulation 10 may be considered, although the provision of suitable screens would normally obviate the need for this.

Gangways and Pouring Aisles

Very closely allied to both the two previous Regulations in respect of the principle involved—that is to say good-housekeeping and the prevention of accidents from the splashing of molten metal—is Regulation (6), which deals with gangways and pouring aisles. It should be noted that this Regulation applies only to those parts of a foundry in which molten metal is transported or used, and that the requirements relate to the provision of main gangways and pouring aisles. A definition is given in Regulation (2) of "pouring aisle" (namely, an aisle leading from a main gangway or directly from a cupola or furnace to where metal is poured into moulds), and, depending on where the moulds are being poured, this might include gangways which may variously be known as lateral, longitudinal or cross gangways.

It is considered that, although the term "main gangway" is not defined, there should be at least one recognized main gangway over which the normal traffic in a foundry is carried, which in the case of new foundry workrooms (see Regulation (6) (*3*)) must comply with the requirements in Regulation (6) (*1*), but only so far as is reasonably practicable in other foundry workrooms. In connection with the latter, the effect of gangways on the floor space available for moulding is one factor which will have to be taken into account in determining whether it is reasonable to comply with the specified widths. Existing foundries with sand floors may be unable to provide lateral or cross gangways with a hard surface, but such gangways ought at least to comply with the requirements in

Regulation (6) (2) (*b*): to provide as many sub-gangways of a hard material as the nature of the work will allow.

In the case of existing foundries having concrete floors there should normally be little difficulty in complying with the requirements in Regulation (6) (*1*) as regards main gangways, and for the requirements to be applied to cross gangways leading from the main gangways to pouring aisles. Great difficulty may be experienced in the provision of gangways with a hard surface in old, heavy-jobbing foundries, where pit moulding is practised, especially if it involves the moving of existing pits. Such pits carry very heavy loads so that it is no easy matter to provide adequate foundations. The Regulation does not ask for straight gangways, although they are obviously desirable. In the heavy, pit-moulding foundry gangways may have to follow the line of the pits—unless they can be constructed down the side wall.

Rails are often set in the gangways to facilitate the movement of bogie ladles. Such a gangway should be regarded as having "an even surface" even if the rails project a little. Molten metal may also be transported on an overhead runway along a gangway, whilst a man walks on the gangway to guide it. In these cases 3 ft. would normally be regarded as an adequate width. Gangways should be hard and level and properly prepared of some material other than sand. Sand should not be allowed to accumulate on the gangways, although according to present experience it is deemed necessary to allow not more sand than is necessary to prevent risk from splashes of molten metal.

It should be noted that Regulation (6) (2) relates to the provision of pouring aisles and that different requirements are laid down for new and existing foundries. Regulation (6) (2) (*a*) requires pouring aisles of hard material (*e.g.*, concrete, iron plates, etc.) for new foundries, apart from the exception provided by (6) (2) (*c*), which exempts any foundry from the provision of pouring aisles where the "floor of the workroom *has* to be of sand." Certain kinds of box work are done at present both on concrete floors in new foundries and on sand floors in old foundries. If, therefore, these old foundries are rebuilt, it will not be possible to claim the exemption in Regulation (6) (2) (*c*) merely because the work used to be done on a sand floor.

Regulation (6) (2) (*b*) requires pouring aisles in existing foundries subject to the exemption of Regulation (6) (2) (*c*). Regulation (6) (2) (*b*) applies therefore to existing foundries where, even though the floor is of sand it cannot be said that it *has* to be of sand. In general, this means all box work done on a sand floor. It should be noted that in the case of existing foundries pouring aisles "of hard material" are not required by the Regulation. The pouring aisles must be firm and even, which means that they may simply be clearly defined aisles, not less than 18 in. wide, where the sand has been levelled to give an "even" surface, and rammed to make it "firm."

It is the practice in some foundries to place boxes side by side in groups and then to walk over the tops of the boxes to pour each one in turn. In this case, the pouring aisles should lead to the group of boxes, but the regulation should not be construed in such a fashion that the boxes in a group must be separated so as to provide an 18 in. pouring aisle between each box. The distance between two consecutive groups of boxes should, however, be not less than 18 in. The distance of 18 in. should be measured clear of any part of, or projection from, any box. The same principle should be applied in calculating widths for other purposes in the Regulation.

Dust Hazards

The next Regulation—(7)—is broadly a health regulation, although one obviously cannot draw a very hard and fast line as between safety and health. The two subjects are obviously allied and although it may be said that this is essentially designed to deal with a health risk, it is of particular importance and perhaps of particular difficulty, and for that reason I ought to comment on it in dealing with the Regulations as a whole. It deals with the subject of dust and fumes and roughly covers the question of fume arising from open coal, coke or wood fires and mould-stoves, core-stoves and annealing furnaces on the one hand, and dust from knock-out, dressing, or fettling operations on the other. It should be noted that this Regulation does not come into operation until January 1, 1956, but firms should consider their position in relation to the Regulation and refer their problems to the appropriate research association.

Regulation (7) (*1*) is aimed at preventing the use of portable open fires for space heating. Fixed fires fall to be dealt with under Section 3 of the Factories Act, 1937. In consequence, all fires evolving fumes and used for space heating in foundries should be fitted with an adequate and suitable flue system. This will cause some difficulty in large buildings where stoves, braziers, etc., have been used in the middle of wide bays because chimneys would obstruct the passage of cranes. Alternative arrangements will have to be made in the ensuing two years before the Regulation becomes operative. It should be noted that Regulation (7) (*1*) prohibits open fires for space heating only. It does not prohibit open fires to thaw frozen sand where this can be shown to be necessary; and no exception would be taken by the Factory Department to the use of these fires for short periods to supplement normal heating during exceptionally cold weather. Regulation (7) (*2*) requires a flue system be installed over all ladles which are being dried by means of open fires.

Regulation (7) (*3*) requires the use of mould dryers for pit moulds. The circumstances in which an open fire is really unavoidable are rare. The "Garrett" Committee took a very firm line on this question of open fires and mould dryers and stated that they were of the opinion that the elimination of open fires in iron foundries was necessary if the best possible conditions were to be obtained; however, they were constrained to observe that although their use could be discontinued in many instances, it might be unavoidable at present to use them in certain cases, owing to the fact that no suitable alternatives were available, and they gave certain

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instances, *e.g.*, they did not think there was an adequate substitute for the open fire in the process of burning on and certain operations in heavy foundries such as the heating of lifting hooks and for drying cores which had been damaged and repaired. They stated also that although they considered it undesirable that open fires should be used in drying moulds, they had to admit that it would not be practicable to attempt their total prohibition, as there were not satisfactory alternative methods yet developed.

Knocking-out Operations

The other part of Regulation (7) deals with the really difficult question of dealing with dust at knock-out. The Regulation as now framed offers a simple alternative between doing it in a separate room or in a separate part of the foundry, suitably partitioned off, which is provided, so far as is reasonably practicable, with effective and suitable local exhaust ventilation and a high standard of general ventilation, or in an area of the foundry in which, so far as is reasonably practicable, effective and suitable local exhaust ventilation is provided, but where that cannot be done, a high standard of general ventilation maintained. No preference is stated for either, although clearly the ideal method would be to segregate this particular operation. Most foundries will probably select the second method. It is hoped, however, that in the case of mechanical knock-out grids, further experiments will be made to ascertain the best method of applying local exhaust ventilation. The knocking-out of heavy castings is a very different operation and there, generally speaking, the job must be done in the casting area. There is as yet no satisfactory method of local exhaust ventilation, so that reliance will undoubtedly in such cases have to be placed on good general ventilation. The knock-out area can, of course, be the casting area, since the Regulation refers to an area of the foundry and not an area set apart for the purpose, and undoubtedly this will be the practice in the case of floor moulding-box foundries. Reliance here will have to be placed on a high standard of general ventilation. In the same way, in dealing with dressing and fettling operations, there is a straight alternative to carrying this out in a separate room or a separate part of the foundry suitably partitioned-off, and arranging for it to be done in an area of the foundry set apart for the purpose with proper arrangements for local exhaust ventilation or with equally effective means of suppressing dust. Most light iron foundries and mechanized foundries have separate dressing shops, and will therefore come under the first alternative. It should be noted that although stripping, de-coring and removal of runners and risers in many cases falls within the definition of dressing and fettling, where these operations are carried out in connection with knocking-out, then they come under the part of the Regulations dealing with the knock-out.

Respirators and Goggles

Regulation (8) is in the main designed to obtain safer conditions of work, although that part of it which deals with respirators is obviously mainly concerned with the health risk. Its main clauses relate to the provision of suitable gloves or hand-protection to prevent burns, cuts and abrasions, and perhaps more important is the requirement as to the provision and maintenance of suitable goggles or eye protection for workers engaged at the cupola, where pouring metal, or engaged in work which might involve a risk to the eyes from hot sand. Goggles, of course, are required under Section 49 of the Factories Act, 1937, in respect of dry grinding operations. Respirators must be of an approved type and a certificate of approval has now been signed and is in the hands of the printers, which in effect limits the approval at present to the "Mark-IV" type and the "Microfilter" models. It is important too to note that this particular Regulation lays a special onus upon the worker to make full and proper use of the protective equipment provided, and places a further onus on him to report if there is any defect in or loss of such apparatus.

Statistics

As this is essentially a safety conference, I should like to say a little more on the question of accident prevention in foundries. It is a fact that whilst the total number of accidents in industry as a whole in this country is progressively decreasing, the tendency in foundries over the past three years has been for the total to rise. In 1950, there were 24 fatal and 10,740 non-fatal accidents; in 1951 22 fatal and 11,033 non-fatal; and in 1952 the figure mounted to 31 fatal and 11,232 non-fatal. These figures themselves must give cause for concern in the industry, as they certainly do to members of the Factory Department.

The main causes of accidents in 1952 in foundries (responsible for 80 per cent. of the total) were as follows:—

	Number of accidents.	Percentage of all accidents in foundries.	Percentage of accidents in factories generally due to this cause.
Power-driven machinery ..	1,337	11.9	16.5
Molten metal and other hot or corrosive substances..	1,556	13.8	4.2
Use of hand tools	1,083	9.6	8.8
Struck by falling body ..	1,107	9.8	8.7
Handling goods	3,743	33.2	27.7
Eye accidents (included also under other headings)	912	8.1	4.6

One would naturally expect, of course, the percentage of accidents due to molten metal and other hot or corrosive substances to be considerably higher in foundries than in the rest of industry and possibly the other figures are also more or less self-explanatory—even the causation group under "handling of goods and materials." I am not at all sure, however, that one would really expect to find the considerably higher rate of eye accidents in foundries compared with industry generally, and that is certainly a type of accident to which very special attention ought to be directed, and the Regulations may possibly help in this direction.

One other point to which I should like to draw attention, particularly, is the fact that in all of these groups of accidents no real progress appears to have been made over the past four or five years. The total number of accidents under these five groups hardly varies from year to year, and I think the industry would do well to look especially at these groups and pay greater attention to precautionary measures designed to deal with these particular hazards.

No Room for Complacency

It will be clear from these facts that there is no scope for complacency within this important industry in the matter of accident prevention, and I am particularly pleased that the Council of Ironfoundry Associations has decided to set up an Accident Prevention Committee and to call a conference of this type. It should do much to engender a greater sense of awareness in the industry in these matters and will, I feel sure, result in a great deal more interest in accident prevention in the individual foundries than perhaps has hitherto been the practice.

If progress is to be made, it is essential that in all foundries an accident prevention organization be established which is an important and integral part of the works set-up. In such an organization, all have a part to play and it must be the earnest endeavour of all management, executives, technicians and workpeople to support wholeheartedly and vigorously the policy of the organization set up, to act according to sensible principles of safety and combine in every effort to present accidents.

Tungsten Ore Trading

The decision of the Minister of Materials to restore private trading in tungsten ores and concentrates on April 1 next was announced by Mr. Heathcoat Amory, Minister of State, Board of Trade, in the House of Commons last week.

Mr. Amory said that private imports from all sources except the dollar area would be permitted from April 1, but in order to ensure a smooth transition from public to private trading and so that the Ministry's surplus stocks might be disposed of with the minimum of disturbance to the market, arrangements were being made with the co-operation of the trade under which in the early months of private trading, consumers would continue to meet a substantial part of their requirements by purchases from Ministry stocks.

The Minister of State intimated that the Ministry of Materials would shortly be communicating with consumers individually about the detailed application of the arrangements. It was contemplated that the proportion of purchases from the Ministry would be reduced as the normal channels of supply were re-established.

Replying to a question, Mr. Amory said that apart from materials in which public trading at present continued, the Ministry of Materials held residual trading stocks of aluminium, copper, lead, zinc, magnesium, sulphur and pyrites, timber, hemp, and mica. While the bulk of these was expected to be disposed of by sale or transfer to the strategic reserves in 1954-55, in the interests of the taxpayer it was necessary to avoid too hasty sales and consequent losses.

Al-Fin Process

Our representative recently had the opportunity of seeing something of the Al-Fin process of bonding aluminium and ferrous metal at the Lymington works of Wellworthy, Limited. This process involves subjecting the ferrous material to a thorough cleaning process to remove all traces of rust, scale, oil and foreign bodies so as to provide a chemically-clean reactive surface for the second stage. The latter consists of aluminizing the surface of the iron so as to form a complex layer consisting of iron aluminides in solid solution with the ferrous material and in solution with the molten aluminium coating. The treated iron, usually in the form of an insert to be cast-in, is then placed in the die or mould, which is then filled (whilst the bond layer is still molten) with an appropriate aluminium alloy or pure aluminium, thus presenting a molecular bond between two dissimilar metals; the nature of the bond is shown in Fig. 1. The process is being very extensively utilized by the Wellworthy Company for the manufacture of motor-car components, where advantage can be taken of the mechanical and physical properties of cast iron, or steel and aluminium to real advantage. This process was independently developed by the Fairchild Engine & Airplane Corporation of Long Island, New York, and the Wellworthy Company, but as the former were first to apply for Patent rights, the latter decided to take out an inclusive manufacturing licence in this country.

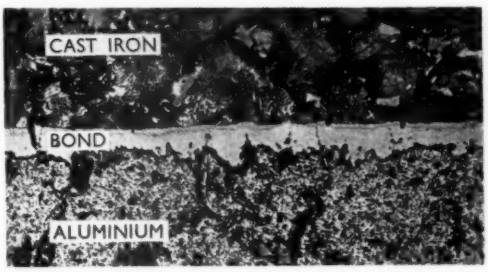


FIG. 1.—*Photomicrograph showing the nature of the Al-Fin bond between cast iron and aluminium.*

By thinking around this process, foundrymen may find in it a solution to some of their own problems in fields other than motor-car manufacture, and if a new field is discovered, then it is understood the granting of sub-licences would be considered.

Rheumatism in Industry

One of the first tasks of the young but active British Rheumatic Association has been to evolve an efficient way of tackling this problem on behalf of industry. Only a few general hospitals in the country have modern rheumatic units, and even these have few beds available. Diagnosis and treatment in the early stages of serious rheumatism are vital. Accordingly, a policy is being followed of providing hostels linked with appropriate hospitals, and a separate organization—B.R.A. Homes, Limited—has been established for this purpose.

The first of these hostels has now been opened at Bracken Hill House at Northwood (Middx). At this early stage there are vacancies; any works' medical officers or advisers who require particulars should write to the British Rheumatic Association, 11, Beaumont Street, London, W.1.

Parliamentary

Accidents in Industry

Moving the second reading in the House of Commons, on February 26, of the Safety in Employment (Inspection and Safety Organization) Bill, MR. W. T. PALING (Lab.) said that this country had long been faced with the problem of accidents in and diseases caused by industry. There were over 10,000,000 workers in respect of whom there were no statutory regulations regarding safety at work, and among them there were about 290,000 accidents a year. It was estimated that the loss to the country as a result of industrial accidents was at least £100,000,000 a year.

Factory and mine inspectors did a good job, but there were not enough of them. The low pay did not attract recruits. Fewer than 4,000 safety committees existed in the 240,000 establishments governed by the Factories Acts, and existing methods of ensuring safety had not substantially reduced the number of accidents. The employee under existing legislation had hardly any right to assist in the enforcement of safety standards although he ran all the risks; his only real right was to leave his job if he disliked the conditions.

The Bill proposed that where more than five people were employed all employers and employees must co-operate to set up accident prevention machinery, that safety delegates, protected from victimization, were to be elected and given the power of inspection and of making complaints about bad conditions to the appropriate inspectorate. Where more than 50 were employed a safety committee would be elected from both sides and would be given definite powers. The Minister was given powers to exempt any industry where the existing arrangements were as good as or better than those proposed in the Bill.

The motion was seconded by MR. FINCH (Lab.).

MR. SPENCER SUMMERS (Con.) said that the Bill would take from management that proper responsibility for safety and health in industry which rightly rested on its shoulders. Co-operation was indispensable for success, and the Bill would provide opportunities for mischief makers which would detract from ensuring co-operation.

The Bill as it was, said MR. HAROLD WATKINSON, Parliamentary Secretary to the Ministry of Labour, or as it could be amended, was not a practicable proposition. The department had considered it carefully, but it was the considered view of its impartial experts that it would not make a practical contribution to greater safety. In 1927 accidents were at the rate of 30 per 1,000 persons employed, in 1952 the rate was 22.5. That was not an acceptable rate, but it was untrue to say that there had been no reduction.

The Ministry already enjoyed considerable powers of compulsion. It would continue to use them wherever it was thought they could fulfil a useful function. If any industry could show the Ministry instances where regulations could be brought in for improving the safety and welfare of the workers, the Ministry would get on with the job. It was examining the whole question of an industrial health service, which would include industrial health and safety. The Bill would remove the voluntary principle entirely and the methods proposed in it were wrong in principle. Co-operation was everything, and the Factories Acts contained adequate powers to apply compulsion where it was needed.

The motion was negatived by 82 votes to 75. As fewer than 100 members voted for the motion, the debate was adjourned.

Trade Marks Appeal Dismissed

In the House of Lords last month it was held that the Registrar of Trade Marks was right in refusing registration of a trade mark consisting of "Yorkshire," represented in special type, for goods which were eventually specified as "solid-drawn tubes and capillary fittings, all being made of copper or non-ferrous copper alloys."

The applicants, the Yorkshire Copper Works, Limited, Leeds, contended that the mark "Yorkshire" was distinctive of its goods. It had previously failed also before Mr. Justice Lloyd-Jacob and the Court of Appeal.

The Lord Chancellor said that a special warning appeared to be given by section 9 (1) of the Trade Marks Act, 1938, against a geographical name. The registrar, before making his decision, had to consider both the inherent adaptability and the distinctiveness in fact of a geographical name. He was faced by the fact that there could not well be a geographical name less inherently adapted than Yorkshire to distinguish the company's goods. Paradoxically, perhaps, the more apt a word was to describe the goods of a manufacturer the less apt it was to distinguish them; for a word apt to describe the goods of A was likely to be to describe the similar goods of B. It was for that very reason that a geographical name was *prima facie* denied registrability. Just as a manufacturer was not entitled to a monopoly of a laudatory or descriptive epithet, so he was not to claim for his own a territory, whether country, county or town, which might in the future be the seat of manufacture of goods similar to his own.

Lords Oaksey, Morton of Henryton, Asquith of Bishopstone, and Cohen delivered concurring opinions.

Industrial Diseases Benefits

During the debate on the second reading of the Industrial Diseases (Benefit) Bill in the House of Lords, attention was drawn by LORD LAWSON to the men who would not be covered by the Bill: those who worked at collieries which became bankrupt during the depression.

LORD SELKIRK, replying, said that the position of these men was not easy. The Government had taken the precedent that had gone before in the Industrial Injuries and Workmen's Compensation Acts. The position should not be covered in a small technical Bill like the present one, and the people to whom attention had been drawn were not the only ones affected. The numbers of men applying under the measure would be considerable and clinical examination might be equal to, or exceed, the total number of examinations carried out under the Industrial Injuries Act. This was quite a large number.

Butane-air Plants

The Minister of Fuel and Power was asked by MR. WATKINS what applications he had received for allocation of foreign currency for the purchase of butane-air plants as an alternative to gas manufacture in Wales, what reports he had received on the success of this development, and what further experiments with this supply he intended to conduct in the rural parts of Wales.

In reply, MR. GEOFFREY LLOYD said that the Wales Gas Board had received licences to import three such plants from the United States and had also imported one plant from France under open general licence. He understood that the plants had so far proved satisfactory. The board was now considering the installation of additional plants and was experimenting with the use of propane in place of butane.

Safety Conference Proceedings

Candid Viewpoints expressed at Ashorne Hill

About 120 delegates, including some from steel and non-ferrous foundries, attended last week's two-day safety conference organized by the Council of Ironfoundry Associations at Ashorne Hill, near Leamington Spa. From members of the Factory Department, Ministry of Labour and National Service, who were present—including the Chief Inspector of Factories, Sir George Barnett himself—as well as members of the newly-formed Ironfounders' Safety Committee, delegates were able to obtain candid replies to their many queries regarding the new Iron & Steel Foundries (Health and Safety) Regulations and safety precautions and organization generally.

The proceedings commenced on Monday evening with Mr. Colin Gresty, chairman of the C.F.A., Safety Committee, presiding. He welcomed those present and tendered apologies for absence from Mr. N. P. Newman, who was abroad, and Mr. Harold Watkinson, Parliamentary Secretary, Ministry of Labour and National Service, who was prevented by his duties from attending, but who had recorded a message of goodwill to the conference, which was then relayed to the assembly.

The New Regulations

The first Address was by Sir George Barnett and was entitled "The Iron and Steel Foundries Regulations, 1953: their Relationship to Safety."* In it, Sir George surveyed each clause in turn and pointed out what were the aims and interpretation and what latitude could be applied in relation to existing foundries. The members of his audience were most enthusiastic in their reception of this Address and it was clear many fears regarding the application of the Regulations had been allayed. Particularly of concern was the implication of the Regulations as applied to heavy-jobbing foundries and it was here that maximum reassurance was given that in applying the written word, hardship would be avoided.

In the lively discussion which followed, delegates asked for and secured clarification from Sir George on the following points: the use of goggles when carrying molten metal; materials for gangways and pouring aisles; definition of danger areas apropos cupola operation and tapping periods; knock-outs in small shops; conflicting requirements of heating and ventilation; respirator usage; gas-drying of moulds and the impracticability of permanent pouring aisles for very large pit-moulded castings.

Later in the evening, a number of safety films were shown, including: "At Whose Door?" (British Iron and Steel Federation); "Accidents Don't Happen—I Safe Clothing, II Organization and III Handling" (Canadian Department of Labour); "Starting From Scratch," "Alert" and "Dressed for the Part" (Shell Petroleum Company). In commenting on these, members appeared to have been more impressed by the Canadian ones, showing in a semi-humorous vein what can happen as a result of neglecting elementary safety precautions.

Exhibition

Also opened that evening and retained for the whole duration of the conference was an exhibition of safety equipment and safety museum items, comprising some hundreds of items compiled by courtesy of the Factory Department and supervised by Mr. J. O. Peacock. Here were shown many varieties of goggles, the two approved types of respirators, protective clothing—gloves, leggings, spats, wristlets, safety boots and masks—grinder hoods and other devices. Also on exhibition were posters and placards of both British and foreign origin to draw attention to factory safety, both of the "horrific" and factual types. A third feature was the incorporation of museum features—sling chains worn to almost hair thickness, electric wires bare and frayed, crane hooks and wire ropes almost on the point of disintegration, unsafe hand hammers and chisels with mushroom heads—all so obviously dangerous that they should have been discarded long before they actually were. Undoubtedly, delegates witnessing these exhibits would go back into their own shops determined to examine their own tackle, personally, with a view to eliminating any such death-traps.

Measures in Other Industries

When the conference re-opened on Tuesday morning, two Papers were first delivered by way of showing what other industries were doing in respect of accident precautions and safety regulations. The first of these was "Accident Prevention in the Iron and Steel Industry" by J. Wadsworth (director, Park Gate Iron & Steel Company Limited). Here the Author described himself as having had for two years the responsibility for the firm's accident-prevention policy but claimed he spoke as an individual. The Paper was divided into seven main sections dealing in turn with provision of a safe place of working; adoption of safe-working procedures; safe-working operators; statistical and other information; management responsibility, and collective attitude of the industry. Appendices, of which seven were given, included such data as classification of lost-time accidents, American job-breakdown, accident report and safety improvement forms and examples of British training programmes and crane inspection reports. Generally speaking, the types of accident referred to by Mr. Wadsworth

* See page 265 of this week's issue.

for steel works followed a similar pattern to those in founding. He placed the whole responsibility for accident-prevention work on the shoulders of managements. It was appreciated by members that, at this stage, the lecturer's account was mainly by precept and that the initial good results reported would need to stand the test of time before a consolidated practical diagnosis of which of the measures taken were really effective could be given.

The second Paper was by Mr. R. W. Lunn, who described accident-prevention work in the British rubber industry. Mr. Lunn is chairman of the accident-prevention committee of that industry's Joint Industrial Council. Over five years the committee had compiled a vast amount of statistical analysed information about the accidents occurring amongst member firms (covering about 50 per cent. of the total of 100,000 wage earners). Theirs turned out to be mainly a problem of machine guarding and as most firms used the same types of equipment, a large proportion of the accident potential could be dealt with collectively. However, he said, mere precept was useless, there being no substitute for real practical on-the-spot hard work and enquiry into accidents and their ultimate causes. Mr. Lunn's report was almost a classic of scientific approach—a statement of the problem; setting up an organization; provision of apparatus; research and collection of data, and interpretation and action on the basis of information secured. By its aid he was able, for instance, to classify that 768 out of 1,000 burn injuries were comprised of damage to 398 forearms, 127 wrists and 243 hands, thus indicating that protection devices below the elbow would eliminate over 75 per cent. of the total burn accidents. From the data collected, a 100-page booklet "Studies of Accidents in the Rubber Industry" had been compiled and distributed and as a result of the application of the recommendations the accident frequency* throughout the membership had been decreased progressively from 1.71 from January to June 1950 to 1.13 from July to December 1953 (ironfounders' frequency over 3.0). An advisory committee of engineers, set up to enquire into two-roll mill accidents in the rubber industry, Mr. Lunn reported, had devised a fool-proof guard which was becoming to be regarded a model in scientific guarding technique. As regards safety personnel, the recommendation was to have an enthusiastic manager/executive who could inculcate safety awareness into the whole of the wage earners and harness all the men in the work.

Iron Foundry Accident Prevention

Continuing the survey of what was already being done, two contributions to the conference were next presented by members of the C.F.A., Safety Committee. The first speaker, Mr. L. V. Marshall (Newton Chambers & Company, Limited) recounted measures taken at a large foundry organization, including a mechanized plant. Special hazards had been encountered, he said, at the point where manual work connected with the mechanized appliances. A plant-inspection policy had been instituted, with particular emphasis on small tools, but it was reported that eye protection—a "must" in the regulations—was difficult to make compulsory in practice; quite everyday carelessness was a feature in a large proportion of accidents, such as a guard being removed by maintenance staff and not being replaced. "Accidents will happen" should, in the opinion of Mr. Marshall, be replaced by "Accidents don't just happen, there is always a cause—and a remedy!"

The second contributor under this heading, Mr. H. A. Bonney (Follsain-Wycliffe Foundries Limited), said his was a small foundry and its safety problems were probably typical of the greater number of foundries in the country. He had no safety officer as such, but had instituted himself in that rôle as part of being the managing director—one able to make immediate decisions on preventive or remedial policy and authorize action, as well as encouraging the other workpeople and infecting them with his enthusiasm, fired by personal example. He gave his own accident analysis as related to plant installed and assembled into the statutory accident register. One successful measure had been to sponsor among his men a general accident insurance on payment of a small premium.

Other aids to improved accident records were: re-lighting the factory; ridding the works of the dirt and obsolete plant thus revealed in the "blind" spots; putting in racks for patternplates; stacking moulding boxes; clearing footpaths, racks for tools, segregation of hand shanks; adoption of battery- or petrol-operated trucks to eliminate lifting and carrying strain and allocation of chain and sling inspection and repair to one firm doing the whole job. Knocking-out was his biggest "headache"—his being a jobbing shop—here he had to rely on good natural ventilation. Among his men he had distributed a safety booklet,† but above all he valued personal contact on safety problems with his men—in effect, taking *advantage* from being a small foundry.

Consensus of Opinion

Later in the morning, the four previous contributions were jointly discussed, during which period the following points arose: For the cost allocation of expenses incurred in relation to safety it was explained that protective clothing, etc., was placed to a "welfare" account and good-housekeeping measures to "repairs and renewals." The C.F.A. was willing to collaborate with the Royal Society for the Prevention of Accidents (represented by Mr. H. Woodhouse) in the preparations of safety posters having a foundry "slant." A suggestion was made that although the safe working load for cranes and sling chains was well marked, it was often very difficult to know the actual weights of the jobs to be lifted—here the use of crane weigh-

* Accident frequency rate is defined as the number of accidents severe enough to cause the loss of at least one shift which occur per 100,000 man/hours of work.

† "Safety in the Foundry." Prepared by the Engineering and Allied Employers, Leicester and District Association, Bank Chambers, Town Hall Square, Leicester (price about 4d.).

ers or the allocation of sling chains according to moulding-box size was recommended. It appeared most users preferred chains to wire-rope slings for foundry purposes, a third alternative put forward being a yoke-piece for mould lifting. Safety committees for small foundries were not recommended, as they often devolved into debating societies. For practical measures in small foundries, Mr. Lunn proposed (1) the introduction of fresh "eyes," that is, personnel who by reason of their newness to a shop perceived hazards overlooked by the men in the shop; (2) a "skim" inspection every day by an executive; (3) temporary exchanges of safety-minded staff between departments; (4) training in essential safety principles for new employees, together with "nursing" of these men by experienced personnel. It was the opinion of the meeting that employees should be set an example by executives and they and any visitors should wear goggles or other protective devices, when they are in a danger area. So much difficulty had been experienced in persuading operators to use approved types of mask that the idea that it might be better for them to wear a device only 50 per cent. efficient for 100 per cent. of the time was put forward, though this was frowned upon by the Factory Inspectorate as being but a negative approach. A light, spectacle-type of goggle was exhibited as an example of the more comfortable models now being developed and Mr. Marshall said his company envisaged putting safety lens in these to replace the ordinary spectacles habitually worn by some of the men. Anti-dimming ointment was said to be readily available to prevent the steaming-up of goggles. Another speaker said it was difficult to wear both goggles and respirator and the Chief Inspector of Factories promised to have this aspect investigated.

B.C.I.R.A. Work

In the afternoon, Dr. H. T. Angus, development manager of the British Cast Iron Research Association, presented an account of the work of the Association's foundry-atmospheres committee. Dealing first with long-term matters, he reviewed the efforts made in the direction of ridding the foundry of harmful dust, mentioning the early prohibition of siliceous grit for blasting purposes. Potential risks arising from the use of the pneumatic chisel and grinding of sand-encrusted castings were currently being investigated, with, he said, a measure of success in both directions which had already been publicized.

Turning to other foundry dust-producing operations, Dr. Angus said that it was important in cleaning up one potential source, that dust should not be transferred to another section or other hazards overlooked. A short research had disclosed that sand with 3 per cent. or more of water was virtually non-dust-producing, and it was therefore recommended that sand from knock-out operations should be watered immediately, so as to bring its moisture content at least to this level before subsequent conveying or treatment operations. Control methods for dust produced at the knock-out were also under active investigation.

Short-term Hazards

On short-term hazards, the Author mentioned the research on dangerous accumulations in foundries of carbon monoxide arising from cupola stack gases, open fires or mould-drying appliances—0.02 per cent. of CO in the atmosphere was quoted as a dangerous concentration. Recommendations in all instances had been made to obviate the build-up of toxic quantities and to introduce adequate ventilation. On this last point, work is, he said, still proceeding on the problem of ensuring proper air changes combined with adequate heating of a foundry on an economical basis. Other possible sources of carbon monoxide or other irritant or harmful gases dealt with were poured moulds, core-stoves, space-heating systems, and ladle dryers. According to Dr. Angus, the foundry area per ton of castings produced per head employed in this country is 18.2 sq. ft., but he foresaw that with increasing productivity and mechanization it would tend to decrease towards the American level of 11.8 sq. ft., with—unless adequate steps were taken—attendant increase of dust and air-pollution hazards.

When the time came for questions, it was revealed that, as yet, there is no really efficient method available for trapping the finest sizes of dust after collection and that disposal of dry dust as collected in filter bags, etc., is still quite a problem. Very fine dust was stated to be extremely difficult to wet with water and wetting agents were of but limited application in this direction. Mr. W. B. Lawrie disclosed that dust extraction through the hollow shaft of a tool had been developed and results would shortly be published. Mr. Colin Gresty, the chairman, at this juncture said that in pursuing its work the Foundry Atmospheres Committee had sought the co-operation of heating and ventilating engineers and makers of foundry equipment. It appeared that local extraction of dust at the point of generation from an appliance was always the solution to aim at—coupled with good general ventilation—but that the problem of dust suppression from knocking-out operations in heavy jobbing foundries was still unsolved.

(To be continued)

Scottish Lime and Limestone Association

At the annual general meeting of the Scottish Lime and Limestone Association, held in Edinburgh last month, Mr. E. M. Cleland (Bairds & Scottish Steel, Limited, Glasgow) was elected chairman, and Mr. F. E. Mew (James Reid & Company, Limited, Lugton, Ayrshire) vice-chairman.

The following were elected to serve on the executive council:—Mr. A. C. Gordon (Northern Agricultural & Lime Company, Limited, Aberdeen); Mr. T. Wilson (Esperton Lime Quarries, Gorebridge, Midlothian); Mr. E. B. Brown (Scottish Co-operative Wholesale Society); Mr. J. Y. Lind (William Lind & Company, Limited, Elderslie, Renfrew); Mr. W. H. H. Beeton (Keir & Cawder, Limited, Glasgow); Mr. Wm. Black, Jnr. (Charlestown Lime, Limited, Fife).

Publications Received

Aluminium/Silicon Alloys. Issued as Information Sheet No. 16 by Foundry Services Limited, Long Acre, Nichells, Birmingham 7.

This is a very useful publication, and covers castings made to B.S. 1490 (LM6) from melting to machining. Naturally the pamphlet introduces the use of the firm's proprietary products, but this does not impair its usefulness.

La Galvanisation Aux Etats-Unis (Galvanizing in the United States). Published by the Organization for European Economic Co-operation, in Paris.

This book describes in considerable detail the latest galvanizing practice as operated in the U.S. and various chapters deal concisely with continuous methods for steel sheet, strip, wire and repetition components as would be expected from any review of United States practice No reference is made to the continuous galvanizing of castings, although it might be possible to infer adaptation of some of the systems described. Very little reference is made to dross recovery which is now becoming an important factor in the economics of galvanizing.

We Schaalvormmethode (Shell Moulding), by H. van Suchtelen. Published by Gieterijcentram, Metaalinstitute T.N.O., Delft, Holland.

This 72-page report would appear to be very comprehensive. It is obvious that the British and American sources of information have been closely studied. An interesting commentary is that in the list of references there is only one from Germany—the birthplace of the process. It would appear that the number of shell-moulding equipment makers has been doubled since this book was prepared for Press. The list of resin manufacturers (seven) having agencies for Holland is quite impressive. Here to, it should be noted, the Germans have already four agencies. The book is quite interesting even for those who can only just "make out" what is printed in Dutch.

Some Important Developments During 1953 in Iron and Steel Technology. Published by the United Nations from Geneva, January, 1954

This publication which covers the iron and steel industry in general includes a description of a small-capacity blast furnace which should be of particular interest to metallurgists who have made a study of cupola operation. This unit, which is for all intents a large cupola incorporating hot blast, has been designed so that the combustion gases are drawn off from below the tuyeres and immediately above the slag level. In practice is has proved adaptable for the reduction of steel turnings and cast-iron borings, and the principles of operation should have possibilities for application to foundry cupola development.

In the same report, reference is also made to the Linz top-blown oxygen converter which is arousing considerable interest amongst steel manufacturers. It is possible to operate this top-blown converter with a basic lining and a high-quality steel is produced free from nitrogen contamination. As a result of the increasing demand by steel works for cheap oxygen for processing, an interesting Table is given of the manufacturing costs of oxygen which on a plant producing 300 tons per day can be as low as $8.89 per metric ton.

MONKS & CRANE, LIMITED, toolmakers, etc., of Birmingham, has moved its Manchester office to new premises at 8, Wilmslow Road, Manchester, 14.

Restraining Wages and Dividends

It is the Government's intention to continue with its policy of moderation and restraint governing both wages and dividends. Reaffirming this in a speech at Glasgow recently, Mr. R. A. Butler, Chancellor of the Exchequer, said that he had never asked or talked about a wage freeze, although he had emphatically and several times reminded the nation of the dangers to our export trade and our whole economy if we sought higher money incomes without correspondingly higher production. It was quite untrue that we had been witnessing a runaway increase in dividends. While the total amount paid in dividends had gone up, the rate of dividend—*i.e.*, the amount distributed as a percentage of the capital employed in industry—had actually fallen. Even if the total of dividends paid was compared with earnings per head, it was found that the rise had been a great deal less in dividends than in earnings.

Mr. Butler reminded his audience that the average shareholder was a small saver and not a millionaire. The wage-earner's situation was better than it had ever been, but the improvement could only be permanent if the country continued to pay its way oversea.

Speaking of increasing competition in the export markets, the Chancellor said that the need for a marked rise in productivity and in productive investment was inescapable. Priority would be given to development in the U.K., not only in the long-established basic industries, but also in new ones such as aircraft production. The renewal and modernization of industrial plant in the U.S. and in Germany, their volume of savings, and the rate of increase of their production, made uncomfortable comparisons with our own. We must find a way to increase our production, our efficiency, and our competitive power. This could be achieved by a well-considered effort to reach higher production and a better standard of life.

Electric Furnace Installations

Over the last four years, Electric Furnace Company, Limited, have supplied nine similar arc-furnace installations, each consisting of a swing-roof, top-charged unit of a nominal 10 tons capacity. The two most recent of these furnaces have been started up over the last 2 to 3 months at the works of Thos. Firth & John Brown, Limited, and Andrews Toledo Works of Darwins in Sheffield. Previous installations were supplied to Atlas Steel Foundry & Engineering Company, Limited, Wm. Shaw & Company, Limited, Stavanger Electro-Staalverk A/S in Norway, and three further new furnace installations are in hand, including a Limited, similar equipment shortly due to be installed 4/5-ton furnace at the works of Spear & Jackson, at the Parker Foundry of F. H. Lloyd & Company, Limited, and a further 10-ton unit to be installed at Head, Wrightson & Company, Limited, in the early summer.

Moisture Control of Foundry Sands.—An apparatus has been placed on the market by the Starplants Company, of Maxwell House, Arundel Street, London, W.C.2, which gives a continuous and easily visible indication of the moisture content of foundry sands as it passes along the conveyor from the sand mill. It naturally provides the mill operation with the means of adjusting the amount with a minimum of delay. For batch plants the installation of a surge bin is recommended. Warning lights or bells can be incorporated.

Estimation and Influence of the Gaseous Elements in Cast Iron*

By L. W. L. Smith, B.Sc., B. B. Bach, B.Sc., A.R.I.C., and J. V. Dawson

(*Continued from page* 238)

Effects of Nitrogen

Little published work is available relating to the effects of nitrogen on the properties of cast iron but it has been shown that nitrogen can exert a considerable influence on the properties of steels. Additions of boron, aluminium or titanium have been found to modify these effects in steel and since these elements occur frequently in cast iron metallurgy it is important to appreciate their possible role in relation to nitrogen.

From experiments which have been carried out by a number of workers investigating the possible effects of oxygen and hydrogen on the properties of cast iron, it is obvious that nitrogen introduced into the melt in gaseous form is without effect on the properties. It has been used for example to remove hydrogen from a melt by a flushing action. The dry nitrogen itself, in the absence of an initial high hydrogen content in the melt, was without effect. Schneble and Chipman[19] determining the effects of the superheating of cast iron in various atmospheres found that a nitrogen atmosphere was without effect on the structure. An inoculating effect was reported however by Rauterkus[26] when nitrogen was introduced into a melt containing aluminium, and was presumed to be due to the formation of nuclei of aluminium nitride.

It is to be expected that difficulty would be experienced in the solution of nitrogen in a gaseous form unless intimate contact with the metal existed. Nitrogen is readily introduced in the atomic state as from a nitrogen containing compound. Close contact of the metal with nitrogen in the atmosphere exists during cupola melting and it has been pointed out earlier that high nitrogen contents can occur in cupola iron. Nitrogen might also be expected to be introduced in electric arc furnaces or receivers.

Jordan[27] has claimed in a Patent that the addition of nitrogen as magnesium nitride or other nitrogen bearing compounds during the production of nodular iron increases the toughness of the casting. Kinnear and Krumlauf[28] have claimed that the addition of nitrates in the ladle increases the nitrogen content and results in increased tensile and transverse strengths with higher impact and hardness values.

The introduction of nitrogen into a malleable iron melt by the use of potassium ferrocyanide was reported by Schwartz[5] to cause the formation of larger temper carbon nodules during the anneal, although no effect on the annealability of the iron during a normal annealing cycle was found. Figures of 134 p.p.m. and 300 p.p.m. nitrogen were quoted for the normal and treated materials used.

Stabilizing Effect

A carbide stabilizing effect has been reported for

*Substantially as delivered to the Birmingham branch of the Institute of British Foundrymen. The Authors are on the staff of the British Cast Iron Research Association.

FIG. 9.—*Hypo-eutectic iron* 5(*a*); *nitrogen* 60 *p.p.m.; etched in* 4 *per cent. Picral;* ×100.

FIG. 10.—*Hypo-eutectic iron* 5(*c*); *nitrogen* 235 *p.p.m.; etched in* 4 *per cent. Picral;* ×100.

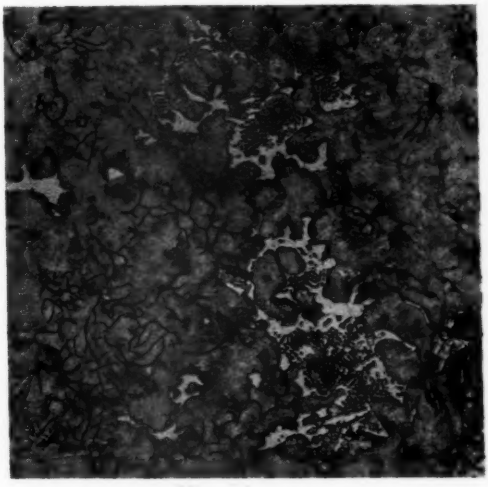


FIG. 11.—*Hyper-eutectic iron 6(a); nitrogen 50 p.p.m.; etched in 4 per cent. Picral;* ×100.

nitrogen in steels and work at the B.C.I.R.A.[9] has confirmed that this is also the case with cast iron. This stabilizing effect is observed during the solidification of the iron and during any subsequent heat treatment to break down the carbide.

In order to increase the nitrogen content of the material under investigation, additions of nitrogen containing compounds were made to the melt either in the furnace or in the ladle. In general sodium ferrocyanide either alone or fluxed was used for the ladle additions and ammonium chloride for the furnace treatments. The latter compound was preferred for the furnace addition as it is easily volatilized and there was less chance of contaminating the furnace crucible.

FIG. 12.—*Hyper-eutectic iron 6(b); nitrogen 175 p.p.m.; etched in 4 per cent. Picral;* ×100.

The stabilizing effect of nitrogen on the formation of cementite during solidification has been shown in both hypo- and hyper-eutectic irons. Two melts of a hypo-eutectic iron of carbon equivalent 3.9 were prepared from a refined iron. In the one case 0.875 in. diameter bars were poured and in the other 1.2 in. diameter bars, using the untreated material and after two increasing additions of ferrocyanide. The compositions of these melts (Nos. 4 and 5) are shown in Table IV. Increases in the transverse and tensile strengths and in the Brinell hardness (Table V) were found when the nitrogen contents had been raised but the more heavily treated bars proved to be mottled and porous, resulting in impaired mechanical properties. The microstructures of two samples, 5(*a*) and 5(*c*), shown in Figs. 9 and 10 reveal the increase in cementite retained as the nitrogen content of the material is increased.

A hyper-eutectic iron (Melt 6) with a carbon equivalent 4.5, prepared from the same refined iron and subsequently similarly treated to raise the nitrogen content again showed the carbide stabilizing effect, this time associated with the pearlitic carbide. Microstructures are shown in Figs. 11 and 12. Corresponding changes in the mechanical properties occurred. Tables VI and VII show the compositions and mechanical properties of this melt.

TABLE IV.—*Composition of Melt IV Series.*

Melt No.	O p.p.m.	H p.p.m.	N p.p.m.	T.C. per cent.	Si per cent.	Mn per cent.	S per cent.	P per cent.
4(*a*)	4	0.9	35	3.41	1.49	0.57	0.082	0.058
4(*b*)	9	1.1	40	3.38	1.56	0.62	0.080	0.059
4(*c*)	1	1.6	225	3.41	1.52	0.62	0.077	0.069
4(*d*)	1	1.9	245	3.42	1.55	0.61	0.071	0.071
5(*a*)	8	1.5	60	3.43	1.61	0.62	0.085	0.054
5(*b*)	3	2.0	200	3.53	1.55	0.62	0.078	0.066
5(*c*)	3	1.8	235	3.52	1.56	0.62	0.075	0.069

A second melt with a similar carbon equivalent prepared from a different pig iron however failed to show any change in properties or structure although the nitrogen content had been raised from 20 p.p.m. to 115 p.p.m. The basic charge had contained more titanium and vanadium than the refined iron used for the other melts and these elements might be expected to combine with the nitrogen and render it inactive.

This carbide stabilizing influence of nitrogen was also observed on the chill produced in a series of chill block tests, both the induced and natural chill being affected. An excessive addition of nitrogen again produced a porous casting. The fractures of one series of these blocks, Melt 7, are shown in Fig. 13 and the compositions in Table VIII.

Influence of Nitride-forming Elements

The influence of elements which form stable nitrides has also been investigated. A number of these elements have been mentioned previously in connection with nitrogen in steel; elements such as aluminium, boron and titanium. It should be

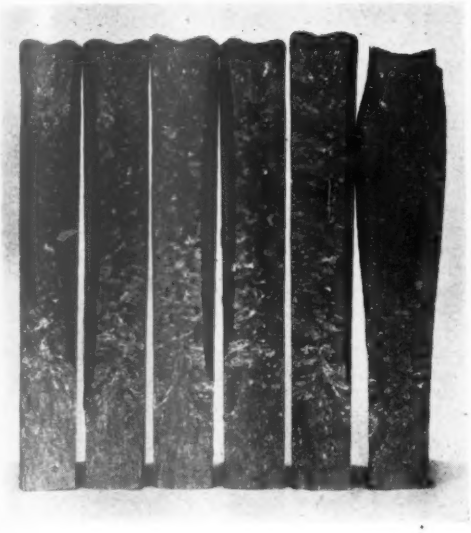
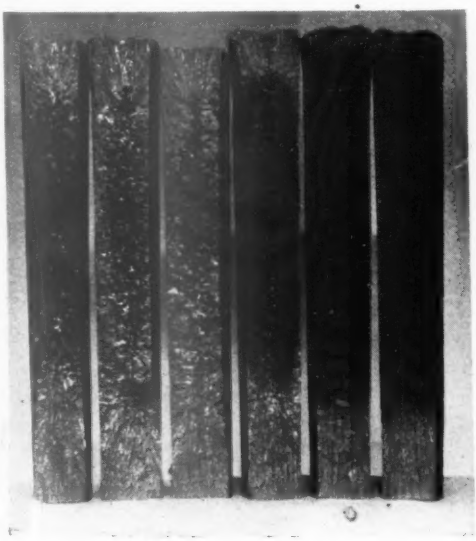


FIG. 13.—*Chill-block fractures from melt 7; nitrogen increasing from 60 to 325 p.p.m.*

noted that these elements are frequently associated also with the removal of the effects attributed to oxygen.

The method used for the addition has varied according to the ease with which solution of the element or alloy could be obtained. In the case

FIG. 14.—(*Melt 8.*) *Addition of aluminium at 150 p.p.m. nitrogen; (left block: untreated, N = 60 p.p.m.).*



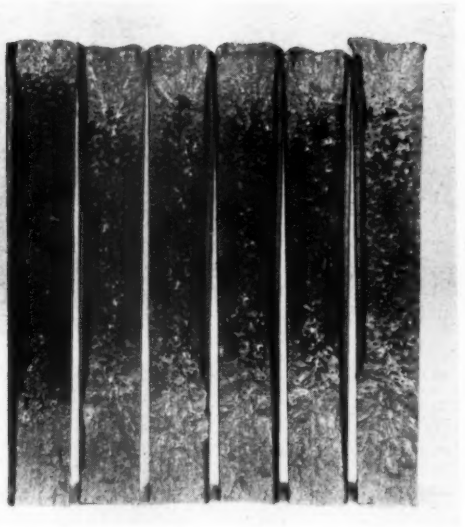
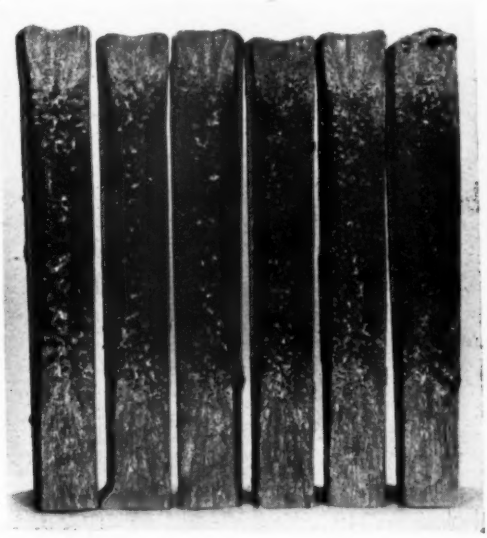


FIG. 15.—(*Melt 9.*) *Addition of boron at 160 p.p.m. nitrogen; (left block: untreated, N = 65 p.p.m.).*

of titanium and zirconium, for example, where higher temperatures were required for solution of the alloys the addition was made in the furnace and the nitrogen content subsequently increased by additions of ferrocyanide in the ladle. Additions of aluminium and boron are more easily made and during experiments with these elements the nitrogen

FIG. 16.—(*Melt 10.*) *Addition of nitrogen in the presence of titanium; (left block: untreated).*



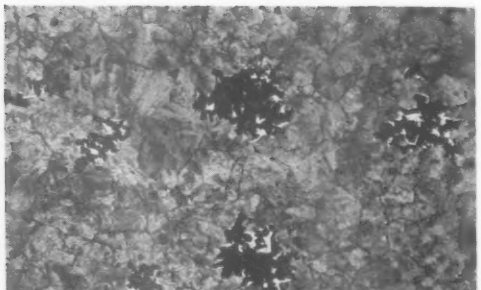


FIG. 17.—*Malleable iron* 11(*a*) *after* 48 *hours at* 950 *deg. C.; nitrogen* 70 *p.p.m.; etched in* 4 *per cent. Picral;* ×100.

content of the melt was first raised and increasing additions of the nitride-forming element were then made in the ladle. The interpretation of the results will therefore vary accordingly. Care had to be exercised during these experiments as to the purity of the alloy used. It was already known that aluminium was potent in its neutralizing effect on nitrogen and it is frequently found in alloy additions. Appreciable additions of silicon could also be added inadvertently due to the use of certain alloys. In general therefore specially prepared alloys were used for these tests.

Aluminium shows most clearly its neutralizing effect on the nitrogen in the chill block tests. The initial increase in the depth of chill obtained by an increase in the nitrogen content to 150 p.p.m. was rapidly removed as the aluminium content increased through the series until with an addition of 0.05 per

TABLE V.—*Mechanical Properties of the Irons of Melt Four.*

Melt No.	Diameter of bar (in.)	Transverse.		Ultimate tensile stress (tons/sq. in.).	Impact strength (ft.-lb.).	Brinell hardness number.	Nitrogen, p.p.m.
		Rupture stress (tons/sq. in.).	Deflection (in.).				
4 (*a*)	—	27.6 29.3	0.139 0.125	16.3	14	212	35
4 (*b*)	0.875	31.3 31.1	0.138 0.134	12.4F*	14	204	40
4 (*c*)	—	38.4 36.8	0.158 0.150	20.4	21	230	225
4 (*d*)	—	34.3P*	0.101	—	—	—	245
5 (*a*)	—	25.5	0.235	14.1	15	118	60
5 (*b*)	1.2	33.0	0.226	18.1	16	234	200
5 (*c*)	—	26.7P	0.163	—	—	—	235

* P = porous. F = flawed.

FIG. 18.—*Malleable iron* 11(*b*) *after* 48 *hours at* 950 *deg. C.; nitrogen* 240 *p.p.m.; etched in* 4 *per cent. Picral;* ×100.

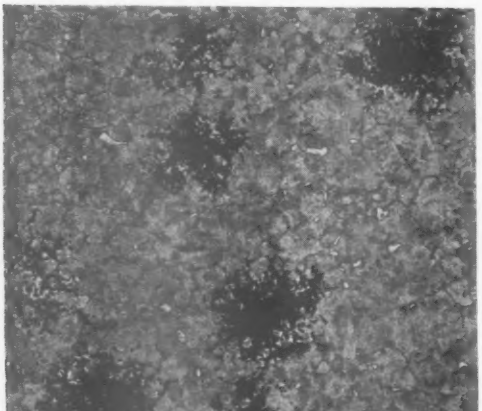


FIG. 19.—*Malleable iron* 11(*c*) *after* 48 *hours at* 950 *deg. C.; nitrogen* 470 *p.p.m.; etched in* 4 *per cent. Picral;* ×100.

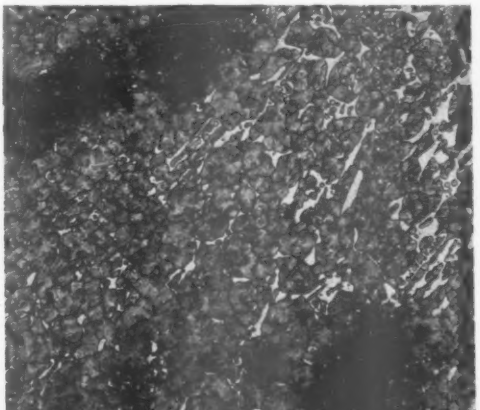


TABLE VI.—*Composition of Melts, 6(a) and 6(b).*

Melt No.	N p.p.m.	T.C. per cent.	Si per cent.	Mn per cent.	S per cent.	P per cent.
6(a) ..	50	3.29	3.46	0.58	0.077	0.067
6(b) ..	175	3.35	3.62	0.58	0.072	0.068

cent. aluminium the natural chill had practically disappeared and the induced chill was less than in the untreated material. The fractures of Melt 8 are shown in Fig. 14 and the compositions in Table IX.

When boron additions up to 0.005 per cent. were made to material containing 160 p.p.m. nitrogen (Melt 9) a slight effect on the chill was observed, but there was no return to the level of chill in the untreated material. At 0.025 per cent. boron an increase in the depth of chill was obtained and presumably through the series any effect of the boron on the carbide stabilizing effect of the nitrogen was masked by the carbide forming tendency of the boron itself. The fractures are shown in Fig. 15 and the analyses in Table X.

Titanium showed a neutralizing effect in these chill block tests. The initial influence of the titanium in reducing the depth of chill was gradually removed as the nitrogen content was raised until the original depth of chill was again obtained. Porosity was obtained with a further increase in nitrogen content above this level. Fig. 16 shows the fractures and Table XI the analyses of Melt 10.

It is not known how this increase in depth of chill in the test blocks due to the influence of nitrogen would be translated in terms of chill in the chill roll industry.

TABLE VIII.—*Composition of Melts, 7(a) to 7(f).*

Melt No.	N p.p.m.	T.C. per cent.	Si per cent.	Mn per cent.	S per cent.	P per cent.
7(a) ..	60	3.61	0.51	0.40	0.060	0.022
7(b) ..	65	3.69	0.51	0.42	0.071	0.022
7(c) ..	90	3.66	0.50	0.41	0.072	0.020
7(d) ..	125	3.68	0.50	0.42	0.071	0.022
7(e) ..	185	3.70	0.50	0.42	0.057	0.024
7(f) ..	325	3.72	0.47	0.41	0.050	0.030

TABLE VII.—*Mechanical Properties on Increasing Test-bar Size for Tests 6a and 6b*

Melt No.	Diameter of bar. (in.).	Transverse.		Ultimate Tensile Stress (tons/sq. in.).	Impact Strength (ft.-lb.).	Brinell Hardness Number.	Nitrogen, p.p.m.
		Rupture stress (tons/sq. in.).	Deflection (in.).				
6 (a)	0.6	23.0	0.120	9.1	—	157	50
6 (b)		27.1	0.110	13.2	—	210	175
6 (a)	0.875	17.2	0.130	7.9	9	141	50
6 (b)		18.9F	0.110	12.4	12	191	175
6 (a)	1.2	16.3	0.270	6.2	8	138	50
6 (b)		22.1	0.270	9.9	9	185	175
6 (a)	1.6	—	—	5.3	6	120	50
6 (b)		—	—	9.1	7	185	175

FIG. 20.—*Melt 12(a) after 4 hours at 690 deg. C.; nitrogen 70 p.p.m.; etched in 4 per cent. Picral;* ×100.

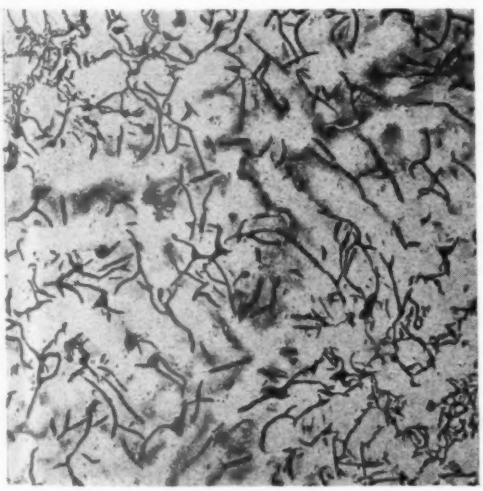
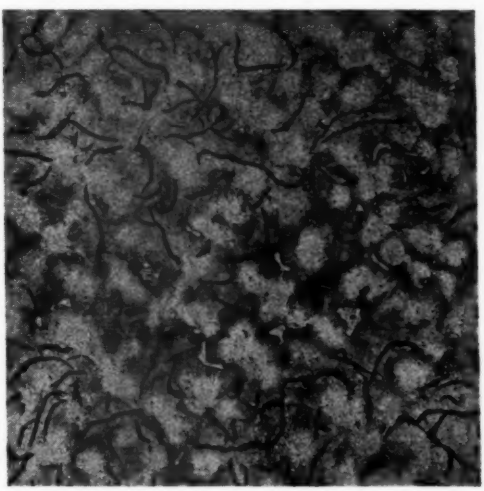


FIG. 21.—*Melt 12(e) after 4 hours at 690 deg. C.; nitrogen 240 p.p.m.; etched in 4 per cent. Picral;* ×100.



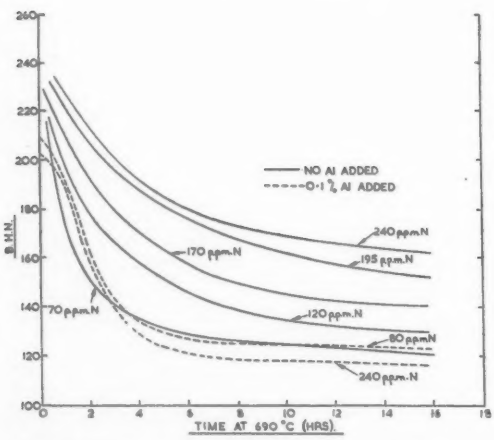


FIG. 22.—*Melts* 12 *and* 13*; Brinell Hardness used as a measure of the amount of pearlite remaining after heat-treatment.*

Stability in the Solid State

That nitrogen has an influence on the stability of carbides in the solid state was observed when nitrogen treated material was subjected to heat-treatment to break down the cementite—a fact of obvious importance in the malleable iron industry. Heat treatment of a white iron (Melt 11, Table XII) of malleable composition held at 950 deg. C. for varying periods showed a delaying effect on the breakdown of the cementite due to the influence of

TABLE IX.—*Composition of Melts,* 8(*a*) *to* 8(*f*).

Melt No.	N p.p.m.	T.C. per cent.	Si per cent.	Mn per cent.	S per cent.	P per cent.	Al added per cent.
8(*a*) ..	60	3.61	0.62	0.35	0.047	0.044	Nil
8(*b*) ..	155	3.62	0.61	0.32	0.047	0.044	Nil
8(*c*) ..	155	3.67	0.63	0.32	0.049	0.041	0.005
8(*d*) ..	150	3.61	0.63	0.33	0.047	0.043	0.01
8(*e*) ..	150	3.60	0.63	0.33	0.049	0.044	0.05
8(*f*) ..	150	3.55	0.65	0.35	0.048	0.046	0.10

TABLE X.—*Compositions of Melts,* 9(*a*) *to* 9(*f*)

Melt No.	N p.p.m.	T.C. per cent.	Si per cent.	Mn per cent.	S per cent.	P per cent.	B added per cent.
9(*a*) ..	65	3.58	0.77	0.47	0.048	0.048	Nil
9(*b*) ..	165	3.59	0.76	0.42	0.049	0.048	Nil
9(*c*) ..	160	3.58	0.73	0.42	0.048	0.048	0.0005
9(*d*) ..	160	3.54	0.76	0.43	0.051	0.046	0.001
9(*e*) ..	160	3.55	0.74	0.43	0.047	0.048	0.005
9(*f*) ..	160	3.48	0.75	0.42	0.048	0.046	0.025

nitrogen. Micro-examination of the structures (shown in Figs. 17 to 19) of samples at three different nitrogen levels after the same period of heat treatment showed that an increasing amount of undecomposed carbide remained as the nitrogen content increased. The size of the temper carbon nodules formed also showed an increase with increasing nitrogen. An increase in the time for completion of the first stage anneal of a malleable iron would be expected on the basis of these results.

From the increased size of the nodules produced at the higher nitrogen levels during this first stage anneal it would be expected that the second stage of the anneal would be similarly retarded. In addition to this factor it has been found that the pearlite itself is stabilized by nitrogen and on this account would also contribute to an increase in the time of anneal required for its removal.

This increased stability of pearlite was shown on a series of bars (Melt 12, Table XIII) with varying nitrogen content, having a grey structure—graphite flakes in a matrix of pearlite with no free cementite present. When subjected to heat treatment corresponding to second stage annealing conditions—

TABLE XI.—*Composition of Melts,* 10(*a*) *to* 10(*f*).

Melt No.	N p.p.m.	T C. per cent.	Si per cent.	Mn per cent.	S per cent.	P per cent.	Ti per cent.
10(*a*) ..	65	3.51	0.64	0.40	0.058	0.028	<0.01
10(*b*) ..	95	3.48	0.66	0.40	0.058	0.030	0.03
10(*c*) ..	150	—	0.66	0.40	—	—	0.02
10(*d*) ..	155	—	0.60	0.38	—	—	0.03
10(*e*) ..	255	—	0.63	0.38	—	—	0.03
10(*f*) ..	320	—	0.64	0.40	—	—	0.02

690 deg. C. in an inert salt bath—an increased stability of the pearlite was evident with increasing nitrogen. After four hours for example, the untreated material at 70 p.p.m. nitrogen had an almost completely ferritic matrix whereas the material at 240 p.p.m. nitrogen was still pearlitic. The structures are shown in Figs. 20 and 21. Combined carbon determinations and Brinell hardness carried out on this series after various annealing periods

TABLE XII.—*Composition of Melts,* 11(*a*) *to* 11(*c*).

Melt No.	N p.p.m.	T.C. per cent.	Si per cent.	Mn per cent.	S per cent.	P per cent.	Al per cent.
11(*a*) ..	70	3.05	0.55	0.37	0.101	0.057	<0.01
11(*b*) ..	240	3.07	0.56	0.36	0.100	0.060	<0.01
11(*c*) ..	470	3.11	0.54	0.37	0.080	0.070	<0.01

TABLE XIII.—*Composition of Melts,* 12(*a*) *to* 13(*e*).

Melt No.	N p.p.m.	T.C. per cent.	Si per cent.	Mn per cent.	S per cent.	P per cent.	Al per cent.
12(*a*) ..	70	3.20	1.82	0.72	0.099	0.106	N.D.
12(*b*) ..	120	3.34	1.91	0.73	0.091	0.107	N.D.
12(*c*) ..	170	3.34	1.88	0.73	0.089	0.106	N.D.
12(*d*) ..	195	3.33	1.91	0.73	0.080	0.113	N.D.
12(*e*) ..	240	3.32	1.88	0.73	0.079	0.113	N.D.
13(*a*) ..	80	3.26	1.73	0.62	0.095	0.110	0.13
13(*e*) ..	240	3.36	1.72	0.61	0.078	0.125	0.12

confirmed these results. A plot of B.H.N. against time of anneal is shown in Fig. 22.

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[27] J. F. Jordan, U.S. Patent No. 2,606,112, August, 1952.
[28] H. B. Kinnear and G. P. Krumlauf, British Patent No. 628,265, August 25, 1949.

(*To be continued*)

Dust Control on Swing-frame Grinders

B.S.C.R.A. Demonstration

The British Steel Castings Research Association recently demonstrated at its dust-research station in Sheffield, a dust-control system applicable to high-speed portable swing-frame grinders such as are extensively employed both in the iron- and steel-founding industries. Present at the demonstration were Mr. T. H. Summerson, chairman of the British Steel Founders' Association, and Mr. F. N. Lloyd, acting chairman (in the absence abroad of Mr. C. H. Kain), of B.S.C.R.A., together with the chairman (Mr. D. W. L. Menzies) and members of the B.S.F.A. industrial health committee.

The latest development in dust suppression follows closely the principles that have already proved so effective on stand or pedestal grinders, which were demonstrated by the Association at the Institute of British Foundrymen's annual conference in Blackpool last year, and were adopted early in 1953 as standard modifications by leading makers of stand-grinder equipment in this country. The new swing-frame grinder device is based upon an internal exhaust system that can readily and cheaply be attached to the wheel-guard of existing machines or built into new equipment. The system is now under extended practical test in industry and at the dust-research station.

As in the case of the stand-grinder system mentioned, it has been designed to operate with relatively low rates of air extraction. Equally important in relation to operating and installation costs, the new system requires no increase in fan horse-power above that which has been observed in the past for the various standard sizes and speeds of grinding wheel. The illustrations show, respectively, conventional and modified machines grinding wood and rusty pig-iron so as to demonstrate the air movement.

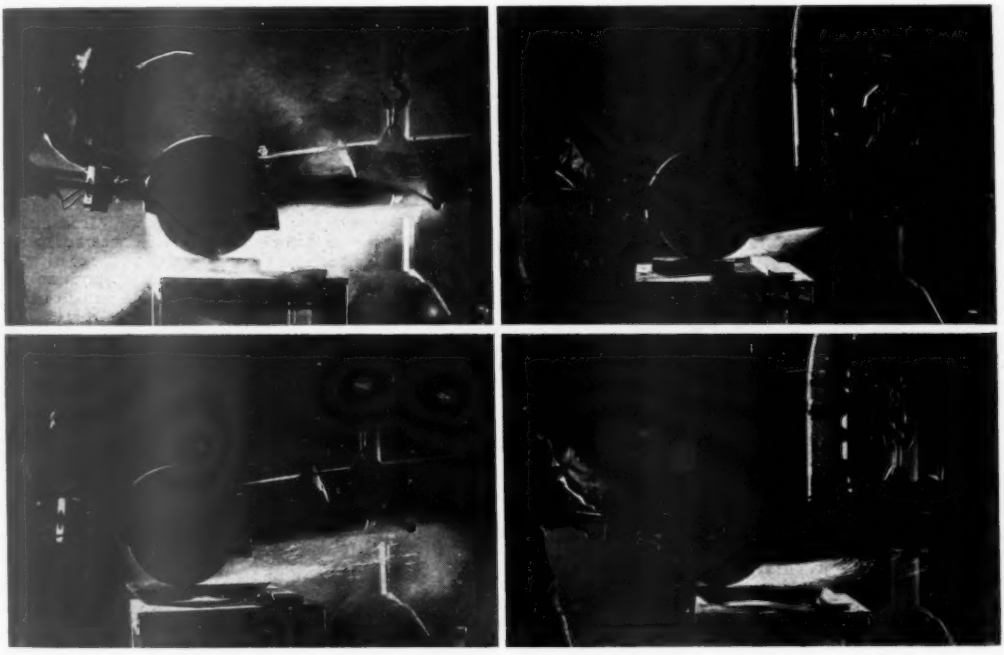


FIG. 1.—*B.S.C.R.A. demonstration of dust control on swing-frame grinding machines: (top, left) conventional machine grinding wood; (top, right) B.S.C.R.A. modified machine grinding wood; (bottom, left) conventional machine grinding rusty pig-iron; and (bottom, right) B.S.C.R.A. modified machine grinding the same pig-iron.*

Increases of Capital

RUDOLPH CARNE & COMPANY, LIMITED, machine-tool dealers, etc., of London, W.4, increased by £8,000, in £1 ordinary shares, beyond the registered capital of £2,000.

PNEUMATIC CONVEYORS (HUDDERSFIELD), LIMITED, increased by £5,000, in £1 5 per cent. cumulative preference shares, beyond the registered capital of £5,000.

ENTWISTLE & KENYON, LIMITED, domestic equipment makers, of Accrington (Lancs), increased by £115,000, in £10 ordinary shares, beyond the registered capital of £85,000.

C. A. PARSONS & COMPANY, LIMITED, Newcastle-upon-Tyne, increased by £3,000,000, in 2,400,000 ordinary and 600,000 unclassified shares of £1, beyond the registered capital of £2,000,000.

ALUMINIUM CASTINGS COMPANY, LIMITED, Greenock (Renfrewshire), increased by £75,000, in 150,000 preferred ordinary shares of 10s., beyond the registered capital of £500,000.

A. REYROLLE & COMPANY, LIMITED, switchgear manufacturers, of Hebburn (Co. Durham), increased by £1,000,000, in £1 ordinary shares, beyond the registered capital of £3,000,000.

Birmid Development Plans

On the eleventh day of the public enquiry into the Birmingham Development plan, the case of Birmid Industries, Limited, and Birmetals, Limited, was submitted in respect of land in their possession at Woodgate, part of which it is proposed to zone for residential purposes. For Birmid, Mr. Eric Blain stated that it was the holding company with works at Smethwick and the whole group produced high-grade castings largely for the aircraft and motor industries. Birmid had an annual turnover of more than £3,500,000 and 35 per cent. of its production went either directly or indirectly for export. The company's part in the country's defence programme and therefore in the defence of Western Europe was beyond assessment. In 1936, Birmetals bought 168 acres of land at Woodgate, and had deliberately gone some distance from the city because their aluminium alloy processes demanded a dust-free atmosphere. The group had no other land capable of development nearer than Nuneaton.

Mr. Harold Goodwin, joint managing director of Birmetals, Limited, said the group was an integrated economic unit, and one of the most progressive and productive in the kingdom. Its products were used extensively in jet aircraft, in guided missiles and in atomic research. One of their factories was the only place in the country where the special castings necessary for the Avon jet engine could be made. The land in question was regarded as the centre for the main development of the group. Further evidence on behalf of Birmid was given by Mr. Richard Hodginson, surveyor and auctioneer. He said he had no knowledge of any proposals to melt ferrous metals on the site.

For Birmingham Corporation Sir Herbert Manzoni, City Engineer and Surveyor, said it had become apparent the company was using only a small proportion of the land and there was an acute shortage of land in Birmingham for residential purposes. If there were grounds for saying that the land was to be used in the foreseeable future for light industrial purposes, he would recommend to his committee that it should be re-zoned for industry.

Ironworks Extensions at Appleby-Frodingham

The first furnace of the new ironworks project at Appleby-Frodingham was blown-in at 11 a.m. on March 1 by Sir Walter Benton Jones, Bart., chairman of the United Steel Companies, Limited. This furnace is the largest in the country: its neighbour will be the largest in Europe. It has a hearth diameter of 27 ft. and a working volume of 43,000 cub. ft. It is equipped with 18 hearth tuyeres and nine bosh tuyeres. Using a 100 per cent. sinter burden it is hoped that outputs of well over 6,000 tons a week will be regularly obtained.

It may not be generally realized that at Appleby-Frodingham, because low-grade British ores are used in these works, more slag per ton of pig-iron is made than in any other plant in the world. To produce 6,500 tons of iron means the production of 8,500 tons of slag, which is a total of 15,000 liquid tons in a week. This equals any production figures in the world. The production of such large quantities of slag has necessitated the introduction of a third slag notch instead of the usual two, and this is a unique feature at Appleby-Frodingham. Carbon refractories are used exclusively on the hearth and bosh but the stack is lined with orthodox firebricks.

North British Loco' Company's Training Scheme

The well-known Glasgow firm, the North British Locomotive Company, Limited, have prepared schemes for training university and engineering apprentices. The normal term of an engineering apprenticeship is five years, and is open to approved candidates who have reached the standard of the General Certificate of Education in England or the Scottish Leaving Certificate. Apprentices will be given a general training, in which they may qualify to such positions as draughtsmen, foremen, production engineers, ratefixers, and/or assistant managers.

Candidates are required to attend, for a minimum of three years, evening classes at a technical school, which will lead to intermediate and final examinations of the City and Guilds of London Institute, or the Ordinary National Certificate in Engineering, or the Higher National Certificate in Engineering. In the event of an engineering apprentice displaying outstanding ability and merit, the company are prepared to promote him to a university apprenticeship training course and to award a scholarship at Glasgow University or at the Royal Technical College, Glasgow, so that he may obtain a degree or diploma in engineering.

University apprenticeship is offered to two classes of applicant:—(*a*) Those who intend to continue their studies at a university or technical college and have qualified to do so; (*b*) those who have graduated at a university or have been awarded a diploma of a technical college. The course will qualify graduates for the Associate Membership of the Institute of Mechanical Engineers so far as practical training is concerned, and it provides the necessary background and experience required by an engineer who seeks a senior position in the management, technical, or administrative side of the engineering industry.

Film Review

NEW APPROACH TO PRODUCTION IMPROVEMENT

This film by Philips Electrical, Limited, is intended to show how modern methods can improve both production and quality. The opening scenes illustrate the Philips Industrial Applications Centre, 122, Brixton Hill, in London, S.W., where firms may take their production problems, which are dealt with under conditions closely simulating those under which the product would normally be manufactured. Examples taken from a number of widely different industries are next given. In this section much of the film is devoted to many aspects of welding, and some interesting multi-point spot welders are demonstrated, as well as precision electronic equipment and a wide range of delicate testing apparatus. Of interest to foundrymen are the applications of high-frequency electric heating, especially in the investment casting process for melting and core-drying. Filters, magnetic and otherwise, for ferrous and non-ferrous swarf removal from coolants are shown.

The film, which has taken nearly a year to produce, is well directed, the background music is appropriate but never overdone, and the dialogue is clearly spoken. Available in both 16-mm. and 35-mm. "sound" versions, with a running time of approximately 50 minutes, the film can be borrowed free of charge by technical colleges, institutions and industrial organizations by writing to the Brixton address.

S. D.

Personal

MR. RICHARD BISHOP, University Demonstrator in Engineering, has been made a Fellow of Pembroke College, Cambridge.

MR. P. M. WILLIAMS has been appointed manager of the foundry plant division of the Incandescent Heat Company, Limited, Smethwick.

FOLLOWING the death of Mr. D. F. Campbell, MR. F. R. MARTIN has been appointed general manager of the Burton Foundry Company, Limited, Burton-on-Trent.

MR. G. B. NORTON, chairman and managing director of Norton (Tividale), Limited, colliery and structural engineers, of Tipton (Staffs), is to be the next Mayor of Dudley.

SIR GILMOUR JENKINS, Permanent Secretary to the Ministry of Transport and Civil Aviation, will succeed Sir John Elliot as president of the Institute of Transport for the session which commences on October 1.

MR. AMBROSE FIRTH, chairman and joint managing director of the Brightside Foundry & Engineering Company, Limited, Sheffield, has been re-elected president of the Sheffield and District Engineering Trades Employers' Association.

MR. W. H. LAWRENCE is retiring from the Fry Group of companies on March 31. He joined the Eyre Smelting Company in November, 1919, was appointed a director of that company in 1931, and joined the Board of Fry's Metal Foundries, Limited, in 1934.

MR. H. H. MULLENS, who has been chairman of the North Eastern Electricity Board since its inception, is to resign from the position on May 31 to take up the appointment of managing director of A. Reyrolle & Company, Limited, switchgear makers, of Hebburn-on-Tyne.

MR. G. H. C. MATHEY, chairman, MR. F. J. EDWARDS, managing director, and MR. R. B. MILLER, works manager, of Thermal Syndicate, Limited, Wallsend-on-Tyne, are on a two-month tour of the United States to see if the company can increase their business interests there.

MR. W. PATON, who was formerly senior metallurgist with Federated Foundries, Limited, Glasgow, has now joined the technical staff of British Electro Metallurgical Company. He will be based at the firm's Glasgow office, 44, York Street, Glasgow, C.2, as from April 1.

MR. B. W. PAYNE, manager of Carron Company, the 195-year-old Scottish ironfounders, flew to South Africa on March 4 on a liaison visit to their associated organization, Carron Company (South Africa), Limited, at Johannesburg. Mr. Payne is on the Board of the South African concern.

MR. ALFRED C. TURNER, who for 31 years has been London manager of General Refractories, Limited, has retired, and to mark the occasion a dinner was held in his honour at the Savoy Hotel, MR. KIRKBY, managing director of the company, presiding. Mr. Turner is to be succeeded by MR. T. S. AIKMAN.

THE BOARD of Staveley Coal & Iron Company, Limited, announces that MR. M. FROGGATT, the secretary, has been elected to a seat on the Board. Mr. Froggatt has been connected with the company for over 30 years and is the joint managing director of the Tilghman's-Richards group of companies and a director of several other subsidiary companies.

THE PRESIDENT of the Board of Trade has appointed MR. H. DOUGLASS, general secretary of the Iron and Steel Trades Confederation, as a member of the committee constituted in May, 1953, to advise and make recommendations about future policy in regard to the taking of censuses of production and distribution. He takes the place of MR. W. L. HEYWOOD, O.B.E., who has resigned.

SIR ALLAN J. GRANT, who is giving up his seat on the Board of John Brown & Company, Limited, Clydebank, was the first man ever to be knighted in a factory. This was in January, 1941, when the late King George toured the Sheffield steelworks of Thomas Firth and John Brown. Sir Allan joined John Brown's in 1911 and became a director eight years later. In 1932 he was both president of the British Iron & Steel Federation and chairman of the steel delegation to Ottawa for the Imperial Economic Conference.

DR. W. H. J. VERNON, principal of the corrosion research laboratories of the Department of Industrial and Scientific Research, who retired on February 28, is one of the country's foremost authorities on the atmospheric corrosion of metals. A Birmingham man, he began his professional career as a lecturer at the Birmingham Central Technical College. He is known particularly for his discovery that the green patina on copper roofs is a sulphate and not, as hitherto believed, a carbonate. He it was, too, who found that the peculiar property of "stainless" steel is due to the fact that it forms a rapid, invisible film of corrosion which prevents further tarnishing. Dr. Vernon has many scientific and academic distinctions. He is a D.Sc. of London, Ph.D. of Birmingham, a Fellow of the Royal Institute of Chemistry and of the Institute of Metals.

Obituary

THE DEATH has occurred of SIR EDWARD GEOFFREY HIPPISLEY-COX, who was a director of the English Electric Company, Limited.

MR. ALCWYN ARNOLD JONES, who was a past-president of the Institution of Heating and Ventilating Engineers, died on February 23.

MR. HARRY MATTHEWS, the founder and principal of H. Matthews & Company, manufacturers of grey-iron castings, of Keighley (Yorks), has died at the age of 69.

MR. GEORGE JENDRASSIK, an eminent Hungarian engineer and expert in Diesel traction, has died at the age of 55. In 1947, he settled in England, where he became a director of Metropolitan Railcars, Limited, and consultant to Power Jets, Limited.

THE DEATH has occurred of MR. ALAN WOOD WHITEHEAD, at the age of 65. He had been connected all his life with the firm of Whitehead Bros., Limited, ironfounders, Springfield Ironworks, Farsley, near Leeds, of which he was managing director for the past 15 years. His interest in the firm will now be taken over by his only son, MR. E. F. WHITEHEAD.

COL. JOHN VICTOR HALL, sales manager and a special director of Firth-Vickers Stainless Steels, Limited, Sheffield, has died at the age of 52. He joined the staff of Thos. Firth & Sons, Limited, in 1926, in the progress and sales department. On the formation of Firth-Vickers Stainless Steels he was appointed assistant sales manager, becoming sales manager in 1945 and a special director a year later.

News in Brief

MONO PUMPS, LIMITED, is moving to Mono House, 1, Sekforde Street, London, E.C.1.

NORTHFIELD FOUNDRY, LIMITED, Brixham, South Devon, have inaugurated a pension and life-insurance scheme for employees.

A BRONZE BUST of James Watt was unveiled last month at the Institution of Mechanical Engineers by Dr. E. D. Adrian, president of the Royal Society.

LOAN SANCTION has been received by Newcastle-upon-Tyne City Council for £8,770 for the provision of four mobile cranes for use on Newcastle quayside.

WILKINSON RUBBER LINATEX, LIMITED, have placed on the market a line of motor-driven self-priming pumps suitable for the chemical industries. They carry the trade name of Linatex.

SLOUGH METALS, LIMITED, state that Mr. L. Gamsa, B.SC. (late of Sheepbridge Engineering, Limited), has been appointed sales manager of the foundry at Oxford Avenue, Trading Estate, Slough, Bucks.

A HIGH-VOLTAGE TEST STATION erected at Hebburn-on-Tyne by A. Reyrolle & Company, Limited, will be officially opened on March 23 by Lord Citrine, chairman of the British Electricity Authority.

STEWARTS AND LLOYDS, LIMITED, have shipped 8,000 tons of steel tubes to the Alaskan port of Haines for a pipe-line. The consignment is part of an order for 19,000 tons, which was obtained in the face of international competition.

MARTONAIR, LIMITED, is now employing the services of a full-time technical sales representative in the Midlands. Arrangements have been made to carry stocks of hoists, cylinders, and valves at the Birmingham office, where a service engineer is also available.

A CONTRACT from the Royal Dutch Steelworks for 4,000 tons of ingot moulds and bottom plates has been placed with the Distington Engineering Company, Limited, Workington. In recent weeks the company has also received an order for 10 shaker-conveyors and duckbills.

NINETY MOULDERS employed by Dobbie, Forbes & Company, Limited, Larbert, stopped work on March 1 because, it was claimed, the sand was too hard to handle. It was estimated that 20 deg. of frost were registered at Larbert overnight—the lowest since March 3, 1947.

A NEW REFERENCE has been made to the Monopolies and Restrictive Practices Commission for an investigation and report on the supply in the United Kingdom of standard metal windows and doors. The report is to cover both the facts of the matter and bearing of the facts on the public interest.

AT THE ANNUAL PRIZE DISTRIBUTION to apprentices of Belliss & Morcom, Limited, Birmingham, the Centenary Cup given by the Apprentices' Association to mark the firm's centenary, and awarded annually to the best apprentice of the year, was presented to Keith Herbert; he was runner-up last year.

AS FROM MARCH 1, British Electro Metallurgical Company, Limited, changed its name to Union Carbide, Limited. The business of manufacturers and suppliers of ferro-alloys carried on by the company will henceforth be carried on under the name of British Electro Metallurgical Company, a division of Union Carbide, Limited.

THE CIVIL DEFENCE TEAM of Richard Thomas & Baldwins, Limited, Cookley Works, Brierley Hill, won the civil defence competition of Richard Thomas & Baldwins and the Steel Company of Wales. Sir Ernest Lever, chairman and chief executive of the two companies presented the trophy to Mr. G. F. Pope, trainer of the team.

G. WADDINGTON & SONS, LIMITED, HULL, tanners and glove manufacturers, are to exhibit at the Factory Equipment Exhibition to be held in the Royal Horticultural Society's Halls during the week March 22 to 26. A comprehensive range of "Furno" industrial gloves will be shown, grouped into three panels—for heavy, medium, and light industry.

IN THE NOTE printed about appointment of Mr. J. Bishop a general manager of Nordac, Limited, Uxbridge, it was stated that he was joint general sales manager of the heavy-castings division of Newton Chambers & Company, Limited. Actually he was engineering sales manager (Gasworks and Chemical Plant Division) of this concern several years ago.

THREE ESSENTIALS for the welfare of workers in modern factories are warmth, hot water, and good food in the canteen. The large part that the gas industry can play in the provision of all three will be demonstrated on the Gas Council's stand at the Factory Equipment Exhibition to be held at the Horticultural Halls, Westminster, from March 22 to 26 this year.

THIRTY-FIVE MEN are to be declared redundant at the Blackburn works, Rotherham, of the British Electro Metallurgical Company, ferro-alloy makers, because of declining orders within the ferro-chrome industry. Originally 14 men were laid off, and because men at the plant thought that senior rather than junior men were given notice, a strike took place, which ended on February 28, having lasted 10 days.

DAVIES & COMPANY, Lion Engineering Works, Abergavenny, have, with effect from December 31, 1953, sold all their interest in the Company to Kibby Enterprises, Limited, a Company controlled by Lt.-Col. Harry Llewellyn. Mr. Goodwin will continue to work for Kibby Enterprises, Limited, at first as manager and later in an advisory capacity, and the business will continue to be carried on as in the past.

A FIRE broke out early on March 4 at the works of Stevens & Struthers, Limited, brassfounders and engineers, Eastvale Place, Glasgow. When the firemen arrived the blaze had spread into the patternshop on the top floor but they confined the outbreak to the machine-shop and a corner of the patternshop, but the interior and roof of the building were badly damaged. Arrangements have been made to carry on business as usual.

ON THE BASIS of information so far received, the Central Statistical Office expects the index of industrial production (1948 = 100) for January to reach 126-127. This is some eight points, or 7 per cent., above the previous record January figure of 118 returned in 1953. For the whole of 1953, output was about 5.3 per cent. higher than in 1952. The index for last December in all industries was 120, compared with 112 in December, 1952.

ORDERS IN HAND with Tees and Hartlepool shipbuilders total 1,200,000 tons dw. Under construction

(*Continued on page* 286)

NEW METHODS

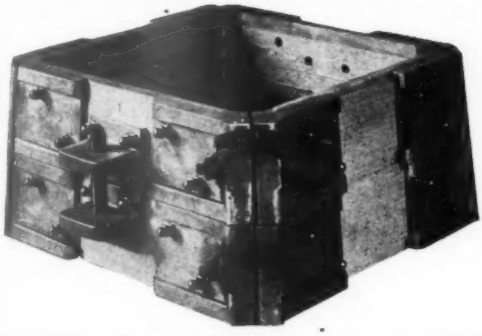
For

OLD

Available at last!

A BRITISH MADE

TAPERED SLIP-FLASK



PATENT APPLIED FOR

- IT can be altered in size at will.
- IT leaves the sand smoothly thanks to a 4° taper from top to bottom working in conjuction with a spring device enclosed in opposing corners.
- IT can be stored flat on a shelf in your stores, thus releasing much valuable space, and, at the same time it is protected from the weather.
- IT is as strong as a steel moulding box and of about the same weight size for size.
- IT does the work of twenty or thirty moulding boxes of similar size.
- IT is less than half the price of any similar Flask.

W. J. HOOKER LTD.

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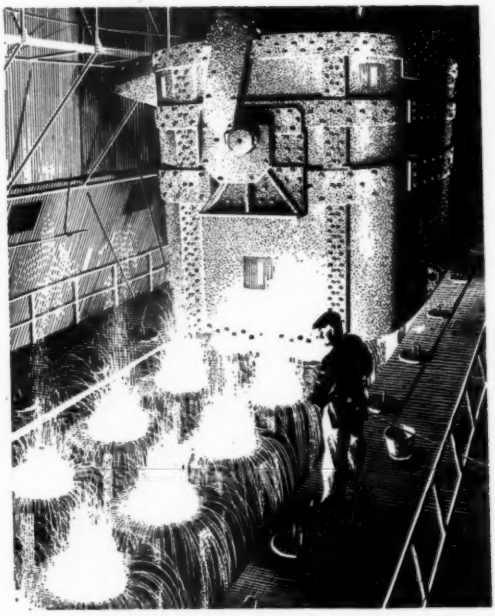


More steel... less fuel

A steel furnace built in 1946 needed 66 therms to produce one ton of steel. The latest type of furnace in 1953 needed only 37 therms. The new open hearth furnaces are three times as big and cut fuel consumption per ton of steel by almost half, as compared with the 1946 unit.

This change is the impressive result of continuous research aimed at reducing the fuel bill by cutting down heat wastage.

The steel industry is not only producing more steel for our needs at home and the raw steel for 40% of our exports ; less fuel per ton is being used in the process.

STEEL is at your service

THE BRITISH IRON AND STEEL FEDERATION S.70

News in Brief

(*Continued from page* 284)

or on order from the Furness Shipbuilding Company, Limited, are 36 new ships with a deadweight tonnage of 803,000 tons, which include six 32,000-ton tankers, and a 31,000-ton ore carrier. Smith's Dock Company, Limited, have 18 vessels of 239,700 tons on order, and Wm. Gray & Company, Limited, have contracts to build 23 ships of 200,810 tons dw.

WORK EXECUTED AND IN HAND since the end of the war at steelworks at home and abroad by the International Construction Company, Limited, in its capacity as consulting engineers, exceeds £150,000,000. The total includes major schemes for the Consett Iron Company, Bairds & Scottish Steel, the Steel Company of Wales, Guest Keen Baldwins, South African Iron & Steel Industrial Corporation, Turkish Iron & Steelworks, Karabuk, Indian Iron & Steel Company, Domnarfvets Jernverk, and A/S Norsk Jernverk.

FOUR-WEEK COURSES for boys from industry, commerce and schools, between the ages of 15 and 19, intended to instil a lasting sense of responsibility, self-discipline and self-confidence through hard physical effort in expeditions on mountains and lakes are held at Brathay Hall Centre, Ambleside, Westmorland. Industrial concerns are invited to nominate boys for these courses, the fee for which is £24. As a follow-up, boys can return for holidays at Old Brathay Hall.

A SEQUEL to the recent visit to the U.S.A. of Mr. E. T. Judge, a director of Dorman, Long & Company, Limited, is the announcement made by the United Engineering & Foundry Company, of Pittsburgh, that they have booked the order for the construction of the proposed wide-flange and structural steel mill at Lackenby. The American company will furnish all the engineering plans and will supervise the building of the mill, but much of the equipment will be made in England and all the electrical equipment will be purchased through British manufacturers.

THE STRENGTH of M.G.7 aluminium alloy was proved when two clock hands, made of the alloy and little more than 2 ft. long, averted a tragedy by supporting the weight of a man for more than five minutes. The incident occurred in Manchester when a man who was repairing the clock of St. Mary's Hospital, 40 ft. above ground, was caught by a gust of wind and lost his balance. Fortunately, as the time was 5.35 p.m., both clock hands were close together and he was able to grab them and hold on until rescued. M.G.7 is a product of James Booth & Company, Limited.

BOTH the retail price index and the index of weekly rates of wages remained unchanged in January, and the February issue of the "Ministry of Labour Gazette" shows how the price index remained steady despite price changes. Taking June, 1947, as 100, the index stood at 140 on January 12, compared with 138 a year previously. The wages index in January stood at 138. Changes in rates reported during the month increased the weekly full-time wages of about 714,000 workpeople by £164,000. Industrial disputes in January involved 52,000 workers and lost about 128,000 working days.

THE Board of Trade's monthly index of import and export prices is now based on 1953 = 100. On this new basis January import prices stood at 98, the same as in the two previous months and a fall of five on January, 1953. Export prices at 99 showed no change over the previous three months and fell by only two compared with January last year. Prices of imported basic materials fell from 100 last December to 98 in January, while imported fuels dropped one point from 94 to 93. Export prices of engineering products improved from 99 in December to 100 in January, although the index for metals dropped from 97 to 96.

SPEAKING at the prize distribution on March 4, Dr. T. D. H. Baber, principal of Keighley Technical College, gave some details of the laboratories and workshops which will be provided in the new college block which is now being erected and which is expected to be completed next year. The well-equipped machine-shops will enable the college to offer training in various branches of engineering, including technological training in metrology, welding, foundry practice, metallurgy and patternmaking, as well as building subjects such as brickwork, carpentry, joinery and plumbing. A specialist laboratory for the study of electronics will, most probably, also be established.

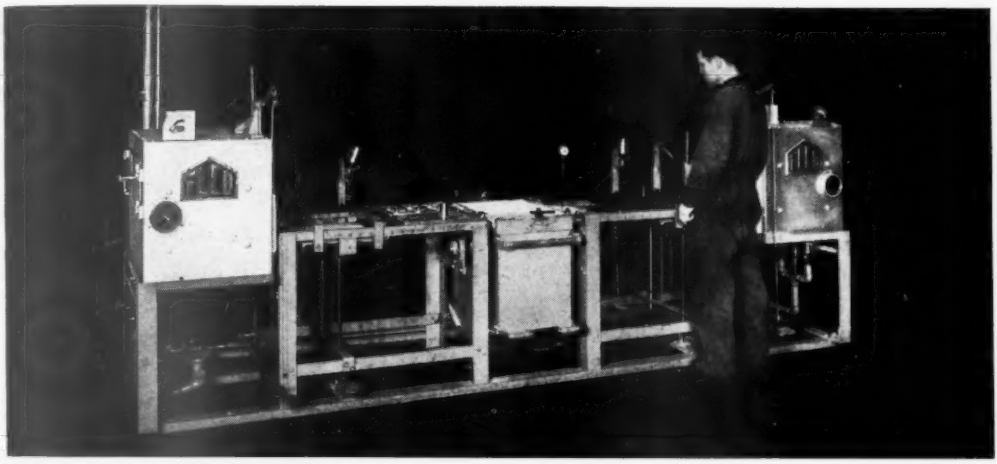
THE BIRMINGHAM BRANCH of the National Union of Manufacturers is compiling a memorandum on the "sterilizing effect" of long-term planning requirements on the industries whose premises are the subject of compulsory acquisition orders. Member firms in Birmingham and adjacent industrial areas have complained that their premises have been taken over by local authorities long before it will be possible for work of re-development to begin. Extreme cases are mentioned of works being acquired 20 years before they will be needed for demolition. When the memorandum is completed it will be considered by the area committee for possible presentation by a deputation to the Minister of Housing and Local Government.

G.W.B. FURNACES, LIMITED, of Dudley, Worcs, announce their entry into the field of low-tension control gear. They have acquired the sole licence to supply and manufacture, for the British Commonwealth, all control gear developed by the firm of Officine Meccaniche Riunite in Milan. O.M.R. have achieved a high reputation on the Continent with installations supplied to rubber firms, steelworks, chemical concerns and machine-tool manufacturers. G.W.B. now supply complete panels ready wired and "tailor made" to specification, also loose contactors, if required, for all purposes. Supplied in a standard range from 10-1,400 amp. a.c. or d.c., the contactors incorporate such refinements as pivot bearings, and sintered tungsten/silver contact faces, giving a life up to 20 times that of conventional copper contacts.

THE PRESENTATION of a master's badge of office given by the retiring master, Dr. J. E. Hurst, and designed by past-master Mr. P. Laithwaite, was a feature of the annual Mayoral Court of Lichfield's Worshipful Company of Smiths, Goldsmiths, Cardmakers and Ironmongers, Pewterers and Braziers, Plumbers, Cutlers, Nailmakers and Spurriers, held in the Guildhall recently. The medallion presented is of vitreous enamel. The basis of the heraldic design is the red chevron on a gold field contained in the coat of arms of the County of Staffordshire, which is also an integral part of the city's coat of arms. At the top of the medallion are two leopard's faces, representative of the smiths, and the base is a rowel representative of the spurriers. It bears the Latin motto *Concodia fabri* (Craftsmen in fellowship). In an encircling ring are the words "The Smiths' Company of Lichfield." Enrolled as a freeman of the company, among others, was Mr. A. R. Booth, foreman moulder, who has been employed with the Lichfield Foundry Company for 28 years.

At Last!

Simple, Efficient & Low cost SHELL MOULDING with the Shelmolda



STUDY THESE POINTS

- **The Shelmolda Senior costs less than £700.**
- Size of plate 24" x 16".
- No complicated controls.
- Moulding always under the operator's control.
- Absolute simplicity—nothing to go wrong.
- Proved by working in a foundry continuously for months.
- Delivery 8—10 weeks.
- **The Shelmolda Junior costs less than £400.**

The Shelmolda brings this modern process within the reach of the smallest foundry. The standard machine illustrated here produces shells 23" x 15" but other sizes can be built to requirements. We shall be pleased to arrange for you to see the Shelmolda working in our foundry.

"Shelmolda"—Originated and manufactured solely by

FAIRBAIRN LAWSON COMBE BARBOUR LTD

LEEDS ENGLAND

⊗ 236/5*

Imports and Exports of Iron and Steel in January

The following tables, based on Board of Trade returns, give figures of imports and exports of iron and steel in January in terms of tonnage and value. Figures for January, 1953, are included for the purpose of comparison.

Total Exports of Iron and Steel

Destination.	Month ended January 31.			
	1954.	1953.	1954.	1953.
	Tons.	Tons.	£	£
Channel Islands	484	403	25,297	22,952
Cyprus	476	1,805	22,403	109,671
Sierra Leone	1,716	193	74,052	13,059
Gold Coast	3,970	3,123	210,298	171,899
Nigeria	4,482	3,910	304,580	276,700
Union of South Africa	3,974	13,947	310,202	920,703
Northern Rhodesia	530	2,338	32,563	161,541
Southern Rhodesia	2,257	4,816	119,824	276,969
Tanganyika	1,079	1,341	59,503	67,952
Kenya	5,358	6,339	295,912	383,477
Uganda	1,137	537	69,716	36,246
Mauritius	636	808	42,259	53,876
Bahrein, Qatar, and Trucial Oman	2,730	2,643	156,113	166,748
Kuwait	1,187	556	64,102	50,787
India	7,436	4,593	513,937	372,325
Pakistan	4,921	5,124	387,756	346,006
Singapore	4,287	2,286	257,217	137,897
Malaya	1,781	2,182	114,051	159,428
Ceylon	1,100	727	69,633	53,160
British North Borneo	491	356	34,649	23,770
Hongkong	2,393	1,434	117,635	91,324
Australia	15,765	20,736	1,122,800	1,474,204
New Zealand	12,993	11,086	723,717	723,260
Canada	11,328	9,477	679,791	598,412
Jamaica	593	1,473	36,059	91,713
Trinidad	3,179	5,820	198,024	395,988
British Guiana	277	309	17,528	19,698
Anglo-Egyptian Sudan	3,416	1,783	172,765	115,333
Other Commonwealth countries	2,664	6,034	158,741	345,775
Eire	3,586	3,790	179,954	192,568
Soviet Union	—	—	—	—
Finland	2,492	3,869	187,059	310,410
Sweden	6,714	5,872	359,867	218,421
Norway	9,002	5,266	484,080	340,989
Denmark	7,591	11,211	498,718	768,714
Western Germany	222	8	34,452	2,086
Netherlands	8,228	12,322	442,129	735,869
Belgium	804	1,253	77,763	130,926
France	535	129	61,858	62,643
Switzerland	635	704	66,376	129,831
Portugal	636	2,349	45,016	139,827
Spain	162	297	16,747	36,774
Italy	6,623	1,686	376,431	209,439
Austria	30	188	8,698	29,751
Yugoslavia	345	8	31,896	5,573
Turkey	801	796	29,059	66,782
Netherlands Antilles	263	1,794	18,304	114,209
Portuguese E. Africa	235	306	12,333	24,753
Lebanon	110	59	8,520	4,949
Israel	747	856	75,323	53,830
Egypt	2,110	1,980	95,896	108,676
Saudi Arabia	380	38	29,425	6,884
Iraq	1,859	4,126	102,727	244,359
Iran	127	310	8,061	17,612
Burma	539	96	33,057	6,107
Thailand	584	405	37,329	45,870
Indonesia	450	799	36,308	71,543
Philippine Republic	504	2	36,168	139
USA	2,513	583	322,989	171,052
Colombia	642	1,038	67,599	65,898
Venezuela	2,169	5,508	167,954	345,022
Ecuador	236	483	18,747	41,732
Peru	273	696	20,460	44,500
Chile	269	411	30,143	39,331
Brazil	121	682	6,518	62,486
Uruguay	1,751	112	119,132	9,109
Argentina	3,518	1,367	256,484	143,698
Other foreign countries	3,547	1,365	266,866	115,346
TOTAL	173,993	189,443	11,061,573	12,778,572

Total Imports of Iron and Steel

From	Month ended January 31.			
	1954.	1953.	1954.	1953.
	Tons.	Tons.	£	£
Canada	11	12,735	4,506	736,408
Other Commonwealth countries and Eire	5,644	9,105	213,527	302,038
Sweden	1,800	2,753	184,214	324,062
Norway	2,230	5,364	149,926	467,909
Western Germany	3,748	1,985	133,385	176,720
Netherlands	9,307	7,993	357,001	223,956
Belgium	6,222	39,145	283,064	1,810,645
Luxembourg	2,642	18,493	85,809	852,396
France	8,959	19,702	235,076	613,288
Italy	29	2	12,881	374
Austria	37,712	23,886	762,504	574,666
Japan	—	3,937	—	208,290
USA	6,726	43,443	420,372	1,898,199
Other foreign countries	4,985	9,721	79,332	244,497
TOTAL	90,015	198,264	2,921,597	8,433,448
Iron and steel scrap and waste, fit only for the recovery of metal	68,161	68,616	1,144,441	1,468,551

Exports of Iron and Steel by Product

Product.	Month ended January 31.			
	1954.	1953.	1954.	1953.
	Tons.	Tons.	£	£
Pig-iron	480	300	9,926	9,591
Ferro-tungsten	42	16	23,219	27,667
Other ferro-alloys	256	208	198,525	205,399
Ingots, blooms, billets, slabs, sheet and tin-plate bars	1,008	24	59,649	2,106
Iron bars, rods, and sections	230	248	12,097	13,430
Steel bars, rods, sections, and shapes	19,898	31,246	1,136,670	1,858,198
Iron plates and sheets	310	57	22,081	5,102
Universal plates	891	1,953	35,071	85,056
Steel plates, ¼ in. and under ⅜ in.	481	864	41,264	51,290
Do., ⅜ in. and over	13,258	19,908	601,023	878,859
Black sheets and black plate	18,046	12,818	1,181,056	1,017,736
Hoop and strip	9,028	3,414	417,420	233,244
Tinplate	25,036	25,285	1,857,352	2,310,626
Tinned sheets, terne-plate, and terne sheets	194	161	20,650	23,294
Decorated tinplate	220	249	18,820	26,728
Galvanized sheets	12,304	7,775	884,185	609,799
Other coated plates and sheets	625	801	51,821	80,517
Railway and tramway construction material	17,317	24,105	777,458	1,125,155
Wire rods	2,680	1,605	81,537	52,365
Wire	4,839	3,529	340,720	303,910
Tubes, pipes, and fittings	44,651	54,304	3,046,399	3,745,423
Iron castings	1,698	167	59,261	17,234
Steel castings	190	267	38,996	46,204
Forgings	441	387	58,470	53,069
TOTAL	173,993	189,443	11,061,573	12,778,572

THEY CHANGED TO FUEL OIL

INSTALLATION COSTS

PAID FOR IN 7 MONTHS

A large manufacturer of non-ferrous metal castings found that by converting the heating of his bale-out pots to fuel oil firing, he achieved a saving of £5,000 per year on an annual fuel bill of £12,000. Furthermore, the £3,000 installation cost paid for itself in 7 months.

Here is another example where conversion to Esso Fuel Oil has resulted in a considerable reduction in fuel costs and a marked increase in operating efficiency. *Your* installation may be particularly suited for conversion to fuel oil firing. May we arrange for our Technical Representative to call and discuss the matter with you.

It pays to say ESSO **FUEL OILS**

ESSO PETROLEUM COMPANY, LIMITED, 36 QUEEN ANNE'S GATE, LONDON, S.W.1

Raw Material Markets

Iron and Steel

Under the Iron and Steel Scrap (Amendment No. 3 Order), 1954, which came into operation on Monday, the controlled maximum delivered prices of scrap are raised to allow for the recent increase in rail freight charges. The main increases range from 2s. to 4s. 1d. per ton. For foundry scrap there is a uniform increase of 2s. 5d., this advance applying to all specifications in Table V of the principal Order, including cast-iron cylinder blocks and heads.

Blast-furnace scrap has been raised by 2s. 5d. and scrap for refined pig-iron manufacture by 2s. 1d.

A much more substantial demand for all grades of pig-iron has developed in recent weeks. Some of the urgency has departed since the rise in prices on March 1, but demand generally is sustained. There is a continued call for low- and medium-phosphorus irons for use by the engineering and speciality foundries, and any further substantial accession of orders by these establishments would find producers and consumers in trouble over supplies.

The recent increase in outputs of hematite pig-iron by the blowing-in of new furnaces has brought some increase in supplies for the foundries, but many of them are specifying larger tonnages than producing furnaces can allocate.

The light and jobbing foundries are certainly working at higher levels of production than was the case some time ago, but there is need for more work to keep all establishments fully employed.

The foundries have good supplies of scrap available, but the demand is keen for the better grades of cast-iron machinery and heavy scrap. Ganister, limestone, and firebricks, as well as foundry coke, are coming forward in adequate tonnages to cover requirements.

Broadly, the trend of trade in steel semis shows little change. Due to slackness in the re-rolling industry, there is only a limited demand for billets and imports have been severely curtailed, but steelmakers are called upon for big tonnages of sheet bars and slabs.

New orders for sections and joists continue to be placed, but at a slightly reduced rate, as consumers are refraining from booking too far ahead. In some instances the heavy-steel works are soliciting orders for their small mills for fairly prompt rolling, as they are finding that they, like the re-rollers, are having difficulty in collecting sufficient tonnage to keep them running at capacity. A heavy demand continues for plates and sheets.

Non-ferrous Metals

Tin put up rather a remarkable show of strength last week, and at the official close on Friday the cash price stood at £690, with three months at £664. In the afternoon cash lost £5, while the forward quotation lost £6 10s., so that the backwardation increased to £27 10s. from £25 a week earlier. On Monday of this week, however, the tin market showed even greater strength, prices rising to their highest levels for nine months. This followed the weekend announcement that although the United States would not sign the Geneva tin agreement, it would withhold from the market its surplus tin stocks. This removal of recent uncertainty regarding the U.S. attitude was coupled with a firmer Singapore market.

With no change in the U.S. quotations of lead and zinc, both these metals gave a good account of themselves in London last week, consumers showing a moderate amount of interest on the advance. After some day-to-day fluctuations, lead improved on balance by 30s. for March, while June advanced by 25s., the backwardation widening by 5s. to £1. In the case of zinc, a gain of 10s. was registered for the current month, while June advanced by 5s. Scarcity of early metal continues to dominate the situation in this metal and the premium for March over June at the end of last week was 30s.

Copper reacted strongly last week to the advance of ½ cent in the Custom smelters' quotation, which moved up to 29.75 cents per lb. During the first half of the week the price movements were erratic on account of uncertainty regarding retention of the Government broker in the copper ring. On Monday consumers were inclined to buy against fears that March 31 would prove to be zero hour, but on Wednesday it was announced that the date had been extended to May 31, after which, however, there is not likely to be any extension of time. Consumers now know that they must be prepared to stand on their own feet without help from the Government. At one time, £241 was reported paid for cash, and a feature throughout the week was the strength of the three months' price, which finally closed last Friday afternoon at £225, a gain of £5 10s. on the week. Cash closed below the best at £238, but, nevertheless, £3 up on the week. Movements on the U.S. Commodity Exchange have broadly reflected the price changes in London.

Official metal prices were as follow:—

COPPER, Standard—*Cash:* March 4, £238 to £239; March 5, £236 10s. to £237 10s.; March 8, £234 to £235; March 9, £235 10s. to £236; March 10, £239 to £240.

Three Months: March 4, £223 15s. to £224; March 5, £224 to £224 10s.; March 8, £224 10s. to £224 15s.; March 9, £225 15s. to £226; March 10, £227 10s. to £228.

TIN, Standard—*Cash:* March 4, £690 to £692 10s.; March 5, £685 to £690; March 8, £705 to £710; March 9, £705 to £710; March 10, £705 to £710.

Three Months: March 4, £663 to £664; March 5, £663 to £664; March 8, £680 to £682 10s.; March 9, £680 to £682 10s.; March 10, £681 10s. to £682 10s.

ZINC—*March:* March 4, £72 10s. to £72 15s.; March 5, £72 10s. to £72 15s.; March 8, £73 5s. to £73 10s.; March 9, £73 12s. 6d. to £73 15s.; March 10, £73 15s. to £74.

June: March 4, £71 5s. to £71 10s.; March 5, £71 to £71 5s.; March 8, £71 15s. to £72; March 9, £72 7s. 6d. to £72 10s.; March 10, £72 15s. to £74.

LEAD—*March:* March 4, £83 to £83 10s.; March 5, £83 15s. to £84; March 8, £84 10s. to £84 15s.; March 9, £86 5s. to £86 10s.; March 10, £88 15s. to £89.

First half June: March 4, £82 10s. to £82 15s.; March 5, £82 10s. to £83; March 8, £83 10s. to £83 15s.; March 9, £85 to £85 10s.; March 10, £87 15s. to £88.

Indian Foundry Training Centre

Mr. John F. Schnur, an American Foundry Technologist of the Armour Research, has, after two years of work assisting in the modernization of Indian casting practice, been appointed by the Ministry of Commerce and Industry to create a Foundrymen's Training Centre at the Indian Institute of Technology, Kharagpur. The Armour Research Foundation of the Illinois Institute of Technology is offering full co-operation from its extensive laboratories. The Centre will conduct residential courses limited to 20 students lasting three months, mainly for foundry foremen and supervisors. The Institute of Indian Foundrymen has a representative on the selection commitee.